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Owasco Lake Outlet Dam
Cayuga County

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.
Owasco Lake Outlet Dam did not reveal any conditions which pose an immediate threat to life or property. Additional studies are recommended. The dam would be overtopped and become unstable by either the PMF or ½ the PMF. However, there would be no significantly increased hazard to loss of life —

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20. (Continued)
downstream as compared to pre-overtopping failure. Minor deficiencies (joint needing repointing, gullies) are noted.

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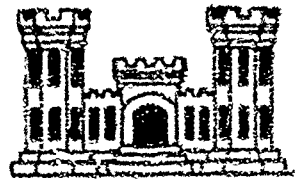
OSWEGO RIVER BASIN

OWASCO LAKE OUTLET DAM

CAYUGA COUNTY, NEW YORK

INVENTORY No. NY 776

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



NEW YORK DISTRICT CORPS OF ENGINEERS

SEPTEMBER 1979

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
OWASCO LAKE OUTLET DAM
I.D. NO. N.Y. 776
#64B-367
OSWEGO RIVER BASIN
CAYUGA COUNTY, NEW YORK

TABLE OF CONTENTS

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Owasco Lake Outlet Dam I.D. No. NY 776
State Located:	New York
County:	Cayuga
Watershed:	Oswego River Basin
Stream:	Owasco Lake Outlet
Date of Inspection:	August 2, 1979

ASSESSMENT

Examination of available documents and a visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property. However, additional studies should be undertaken to further evaluate conditions affecting the dam.

Using the Corps of Engineers' Screening Criteria for initial review of spillway adequacy, it has been determined that the dam would be overtopped by either the PMF (Probable Maximum Flood) or ½ the PMF. Based on the structural stability analysis, the dam would be unstable under the depth of overtopping associated with the PMF and only marginally stable under the depth resulting from ½ the PMF. However, dam failure from overtopping would not significantly increase the hazard to loss of life downstream from that which would exist just before overtopping failure. Therefore, the spillway capacity is adjudged as being inadequate.

The structural stability analysis performed for this report indicates that for severe conditions (ice loading, PMF) the safety factors fall below 1.0. A more detailed analysis is required.

The structural stability analysis should be commenced within 6 months of the date of final approval of this report. Within 18 months of the date of approval, modifications to the structure deemed necessary as a result of this analysis should be made.

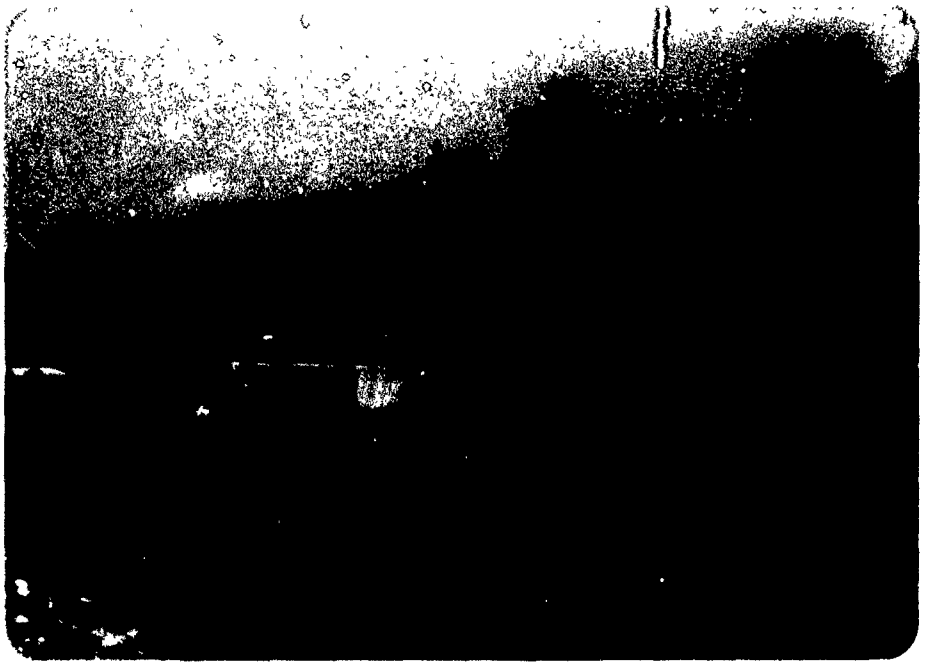
There were several minor deficiencies noted on this structure as well. Some of the joints between the masonry blocks needed to be repointed. Small gullies had formed on the downstream slopes near the abutments. These minor deficiencies should be corrected within 1 year of the date of approval of this report.

George Koch, Chief
Dam Safety Section
New York State Department
of Environmental Conservation
NY License No. 45937

Approved By:

Col. Clark H. Benn
New York District Engineer

Date: 25 Sept. 79.



Overview - Owasco Lake Outlet Dam I.D. No. N.Y. 776

Overview - Downstream Face

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
OWASCO LAKE OUTLET DAM
I.D. NO. N.Y. 776
#64B-367
OSWEGO RIVER BASIN
CAYUGA COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase 1 inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection

This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam

The Owasco Lake Outlet Dam, also known as the State Dam, is a masonry and concrete dam with a principal spillway channel, flow in which is controlled by a tainter gate, and an auxiliary spillway along the crest of the dam.

The main section of the dam is a masonry structure which is approximately 90 feet long and 13.5 feet high. There are reinforced concrete wingwalls on either end of the masonry portion of the dam. Steel sheet piling extends out from the outside concrete wingwall on either end of the dam.

The principal spillway channel is formed by two wingwalls on the western end of the structure. The channel is 13.7 feet wide. Flow in the channel is controlled by the tainter gate.

The crest of the masonry section is designed to act as the auxiliary spillway. It is divided into five sections by the piers of a foot bridge which crosses the crest. There are stop gates on each of the sections which can be raised to increase the outflow.

There is an abandoned canal to the west of the principal spillway. The portion of this canal upstream of the dam has been filled with soil. One of the rows of sheet piling extends in front of this embankment section. The downstream portion of this canal is used as a settling basin for back flushing the filters of the water treatment plant.

b. Location

This dam is located on Owasco Lake Outlet in the City of Auburn. It is approximately one mile upstream of the Mill Street Dam and about two miles downstream of the northern end of Owasco Lake. The western end of the dam can be reached from Pulsifer Drive which is located off N.Y. Route 38.

c. Size Classification

The dam is 20 feet high and the reservoir has a storage capacity of 64,233 acre-feet. Therefore, the dam is in the large size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

The dam is classified as "high" hazard due to the presence of a large number of homes and commercial establishments in the City of Auburn as well as the Mill Street Dam located downstream of this dam.

e. Ownership

The dam is owned by the City of Auburn. The City Engineer is Mr. Michael O'Neil. The City Engineer's office is at 24 South Street, Auburn, New York 13021 and the phone number is (315) 252-9531.

f. Purpose of Dam

The dam was originally constructed to provide a pool for generating power for several mills downstream of the dam. The primary uses of the dam now are to maintain the level of Owasco Lake and to regulate outflows from the lake.

g. Design and Construction History

The dam was originally constructed in about 1836. No information concerning the original design or construction was available. The structure has been repaired or reconstructed several times since the original construction. The most recent reconstruction was in 1972, to repair damages caused by tropical storm Agnes. This reconstruction was designed by O'Brien and Gere Engineers, Inc. of Syracuse, New York.

h. Normal Operating Procedures

Outflows from the dam are regulated in accordance with a prescribed schedule so as to control the levels of the lake. Operational requirements governing minimum and maximum flows at various times of the year take precedence over the strict adherance to the prescribed schedule. These requirements are outlined in the "Operation and Maintenance Manual for Local Flood Protection Project on Owasco Outlet at Auburn, New York", prepared by the Corps of Engineers, Buffalo District.

1.3 PERTINENT DATA

a. Drainage Area — 207 sq. miles

b. Discharge at Dam

	Water Surface Elevation	(cfs)
Spillway Gates - Fully Open	717.0	4061
	716.5	3804
	715.2	2459
Tainter Gate - Fully Open	717.0	1731
	716.5	1700
	713.27	1483
	710.72	1287

c. Elevation (USGS Datum)

East Abutment (sheet piling)		717.0
West Abutment (sheet piling) and Center Pier	Top-of-Dam	716.5
Top of Foot Bridge over Stop Gates		715.87
Bottom of Foot Bridge over Stop Gates		715.12
Top of Stop Gates		713.27
Spillway Crest		710.72
Crown of Tainter Gate		706.45
Invert of Tainter Gate		699.45

d. Reservoir Surface Area
Spillway Crest — 10 sq. miles

e. Storage Capacity:

	Owasco Lake	Flood Channel	(Acre-Feet)
East Abutment	64,000	233	64,233
West Abutment	60,000	222	60,222
Spillway Crest	17,600	112	17,712

f. Dam
Masonry with Reinforced Concrete Walls and Steel Sheet Piling extending from ends.

Dam Length (total)	258 ft.
Crest Elevation @ West Abutment	716.5
Width @ Auxiliary Spillway Crest	6.5 ft.

g. Spillway
Principal Spillway
Type: Channel 13.7 feet wide with tainter gate.

Auxiliary Spillway
Type: Concrete cap on crest of masonry. Divided into five sections by piers of foot bridge, each section 17.4 ft. wide by 4.4 ft. high. Stop gates in place on each of the sections with lift machinery also in place.

h. Reservoir Drain - None

i. Appurtenant Structures

Abandoned canal to west of principal spillway.
Sheet piling and embankment section block entrance.
Downstream portion used as settling basin.

SECTION 2: ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

The Owasco Lake Outlet Dam is located near the border between the glaciated Alleghany Plateau physiographic province and the Erie-Ontario plains province of New York State. This portion of the Alleghany Plateau is cut by the Finger Lake troughs, which are glacially modified valleys of preglacial rivers. The bedrock in the area is predominantly limestone overlaid by shale, siltstone, and sandstone. These rock forms are from the Devonian period of the Paleozoic Era. The surficial soils are the result of glaciations during the Cenozoic Era, the last of which was the Wisconsin glaciation.

b. Subsurface Investigation

No subsurface information was available concerning the foundation of the original dam. Six borings and two probe holes were progressed in 1972 to provide information for the reconstruction done that year. These borings indicate that the subsurface conditions generally consist of sand and gravel overlying thin-bedded shale. The first several feet of the shale are highly weathered.

2.2 DESIGN RECORDS

No records were available from the original design of the structure. Plans for the 1972 reconstruction, prepared by O'Brien and Gere Engineers, Inc., were available and have been included in Appendix F.

2.3 CONSTRUCTION RECORDS

The only construction records available were from the 1972 reconstruction. Plans prepared by O'Brien and Gere have been included in Appendix F.

2.4 OPERATION RECORDS

Lake levels are recorded daily on the staff gage on the east pier. Records are kept for the City of Auburn's water treatment plant.

2.5 EVALUATION OF DATA

Data concerning the original design and construction of the dam was very limited. The information concerning the 1972 reconstruction which was available included a set of plans which outlined most of the important details on the structure. The information available appears to be adequate and reliable for the purpose of the Phase 1 inspection.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of the Owasco Lake Outlet Dam was conducted on August 2, 1979. The weather was clear and the temperature in the eighties. The water surface at the time of the inspection was slightly below the gates of the auxiliary spillway. The tainter gate on the principal spillway was partially opened.

b. Masonry Section and Wingwalls

The masonry and the concrete cap which is on top of it appeared to be in good condition. There were some joints between blocks of masonry which needed to be repointed. The sheet pile wingwalls which extend from each abutment section were also in good condition. There were small gullies caused by surface runoff on the downstream slope at the abutments on either end of the masonry section.

c. Spillways

Both the principal and the auxiliary spillway sections appeared to be in satisfactory condition.

d. Downstream Channel

The downstream channel was in satisfactory condition. There was a wingwall and riprap extending well downstream of the dam on the east bank. The west bank was an earthfill on a steep slope with several gullies caused by surface runoff.

e. Reservoir/Upstream Channel

Owasco Lake is approximately two miles upstream of the dam. The channel between the lake and the dam was upgraded as part of a local flood protection project by the Corps of Engineers, Buffalo District, in 1961. The channel appeared to be stable and in good condition.

f. Appurtenant Structures - Abandoned Canal

The inlet to the canal on the western end of the dam has been blocked. Downstream of the axis of the dam, the canal is still in existence and is used as a settling basin. The sides of the canal were in satisfactory condition.

3.2 EVALUATION OF OBSERVATIONS

Visual observations of this dam revealed the following deficiencies:

1. Several joints between blocks of masonry needing to be repointed;
2. Small gullies on the downstream slope at each abutment;
3. Erosion and gullies on west bank of downstream channel.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

This dam is operated according to procedures outlined in the "Operation and Maintenance" manual for the flood protection project. Outlet flows are regulated so as to control the levels of the lake in accordance with a prescribed schedule. A set of operational requirements governing minimum and maximum flows at various times of the year take precedence over strict adherance to the prescribed schedule.

4.2 MAINTENANCE OF DAM

The dam is inspected and maintained by the City of Auburn in accordance with the requirements stated in the "Operation and Maintenance" manual. Maintenance of the dam and appurtenant structures is performed as required. Minor deficiencies which were noted, small gullies at each abutment and joints needing to be repointed, are items which should be corrected by increased maintenance efforts.

4.3 WARNING SYSTEM IN EFFECT

No apparent warning system for downstream evacuation of residents during extreme flood is present.

4.4 EVALUATION

While the operation procedures for this structure are satisfactory, additional maintenance effort is required. Minor deficiencies noted in Section 3.2 should be corrected through increased maintenance.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The delineation of the contributing watershed to this dam is shown on the map entitled "Drainage Area - Owasco Lake Outlet Dam" (Appendix C). The irregular-shaped, north-south oriented watershed of some 207 square miles is about 32 miles long and has a maximum width of 10 miles. The watershed exhibits relatively steep topography with elevations rising from the lake level of 710 to the ridges at elevations near 1600. The major tributary within the watershed is named Owasco Inlet which empties into Owasco Lake. The 11-mile long lake has a surface area of 10 square miles and is linked to the dam site by an improved channel. The 1.8-mile long floodway channel, only a portion of the entire 21-mile long Owasco Outlet which flows northerly from Owasco Lake through the City of Auburn to the Seneca River, drains some 2 square miles of the entire watershed's 207 square miles.

5.2 ANALYSIS CRITERIA

Existing hydrologic/hydraulic information (Ref. 1a, 1c) concerning the Owasco Lake Watershed was used to obtain elevation-storage capacity data, elevation-surface area data, watershed characteristics, and improved floodway channel data.

The analysis of the spillway capacity of this dam was performed using the Corps of Engineers HEC-1 computer program, Dam Safety version. A standard project flood (SPF) hydrograph (Ref. 1d) developed for Owasco Lake was input directly into the program, which then flood routed this hydrograph using the "Modified Puls" method over the spillway. The spillway design flood selected for analysis was the Probable Maximum Flood (PMF) in accordance with the recommended guidelines of the U.S. Army Corps of Engineers. The PMF storm event is approximately twice the size of the SPF storm event.

5.3 SPILLWAY CAPACITY

The concrete and masonry spillway structure consists of a tainter gate with an upstream debris trashrack and a broad-crested weir topped by five vertical-lift sluice gates. The tainter gate has a maximum opening of 7 x 13.7 feet and was analyzed for orifice flow conditions. This gate is the primary control device used in regulating the levels in Owasco Lake. The five sluice gates atop the overflow spillway section are normally in the closed position. However, for this analysis, the gates were analyzed under orifice flow conditions when fully opened, allowing for maximum discharges to occur in the downstream channel. Since this dam is a maintained regulating structure, operation of the gates was a reasonable assumption made during the analysis.

The spillway does not have sufficient capacity for discharging the peak outflow from one-half the PMF. For this storm event, the peak inflow is 70,684 cfs and the resulting peak outflow is 10,354 cfs. The computed spillway capacity with all gates fully open is 5,763 cfs.

5.4 RESERVOIR CAPACITY

The reservoir impounded by this dam consists of Owasco Lake and the 1.8-mile long improved floodway channel from the lake to the dam. The normal water surface varies between lake elevations 710 and 715. A schematic drawing showing the annual time-variation of lake levels is included in Appendix C. The impounded storage capacity for the spillway crest elevation of 710.72 is 17,712 acre-feet. Surcharge storage capacities to the top-of-dam elevations of 716.5 at the west abutment and 717.0 at the east abutment adds 42,510 acre-feet and 46,521 acre-feet respectively. This surcharge is equivalent to 3.8 inches and 4.2 inches respectively of direct runoff over the entire drainage area. The total storage capacity of the dam at elevation 716.5 is 60,222 acre-feet.

5.5 FLOODS OF RECORD

The maximum known flood in the watershed occurred on June 25, 1972 during tropical storm Agnes when a lake elevation of 716.88 was recorded. This storm event caused cracking in the existing masonry walls at the tainter gate, resulting in the need for structural repairs which were completed after September 1972. Hence, the existing "new" dam has not been subjected to a similar major flood event. However, if the lake level were to reach this same 716.88 elevation and all gates were fully opened, the discharge would be approximately 6086 cfs.

5.6 OVERTOPPING POTENTIAL

Analysis indicates the spillway does not have sufficient discharge capacity for one-half the PMF. The computed depth of overtopping at the west abutment (elevation 716.5) is 3.49 feet for this storm event. Overtopping would occur for all storm events exceeding 30% of the PMF, under flow conditions having all gates fully open.

5.7 EVALUATION

This dam does not have sufficient spillway capacity to adequately discharge the peak outflow from one-half the PMF with all gates fully open. Prior studies (Ref. 1a) have determined that serious damage can occur downstream when discharges exceed 1,500 cfs. However, dam failure from overtopping would not significantly increase the hazard to loss of life downstream from that which would exist just prior to overtopping failure, because discharges would have already exceeded 1500 cfs. Therefore, the spillway is assessed as being inadequate.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual inspection of the structure did not reveal any signs of major distress. The masonry appeared to be in good condition with no seepage between block and only a few of the joints needed to be repointed.

b. Data Review and Stability Evaluation

The primary source of structural and subsurface information for this dam was the set of plans for the work performed in 1972. Cross-sections shown on these plans were used to perform a structural stability analysis.

The following conditions were analyzed:

a. Normal conditions with water level at masonry crest;

b. Water level at masonry crest with an ice load of 7,500 lb./ft.;

c. One-half PMF, water flowing over the masonry crest at a depth of 3 feet;

d. PMF, water flowing over the masonry crest at a depth of 13 feet.

The analyses performed (See Appendix D) indicate that the factors of the safety against overturning and sliding are as follows:

Case	Factors of Safety Overturning	Sliding
a. Reservoir at masonry crest, no ice;	1.82	2.26
b. Reservoir at masonry crest, ice load 7,500 lb./ft.	.84	1.07
c. One-half PMF, water flowing over masonry at depth of 3 feet;	1.34	1.38
d. PMF, water flowing over masonry at depth of 13 feet.	.94	.84

The safety factors against both overturning and sliding for all conditions are below recommended levels. The analyses indicate that for the extreme conditions (ice load or PMF), the dam is not stable.

A more detailed structural stability analysis is required. Field investigations are required to obtain more information about the quality of the rock upon which the dam is founded. This information should then be incorporated into a more detailed structural stability evaluation. Based on the results of this evaluation, it should be determined whether modifications to the structures are required.

d. Seismic Stability

This dam is located in Seismic Zone 2. Due to the location, a seismic stability analysis was performed in accordance with Corps of Engineers guidelines. The seismic analysis was performed for normal conditions with the water level at the masonry crest. The safety factor against overturning with seismic considerations included is 1.67 and against sliding is 1.45.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase 1 inspection of the Owasco Lake Outlet Dam revealed that the spillway capacity is inadequate and outflows from either the PMF or ½ the PMF would overtop the dam. This overtopping could cause breaching of the dam. However, dam failure from overtopping would not significantly increase the hazard to loss of life downstream from that which would exist just prior to overtopping failure, because discharges at the dam would have already exceeded 1500 cfs, previously determined as the maximum allowable non-damaging downstream discharge.

The stability analyses which were performed for the structure indicate that for severe conditions (ice loading, PMF), the safety factors fall below 1.0. In addition, several minor deficiencies were noted which should be corrected through increased maintenance efforts.

b. Adequacy of Information

The information for the preparation of this report was adequate.

c. Need for Additional Investigations

Further analysis of the structural stability is required. This analysis should be a more detailed study than was made for this report. Included should be a series of subsurface investigations to obtain more information about the rock foundation and a determination as to whether modifications to the structure are required to increase the stability.

d. Urgency

The additional investigations which are required should be commenced within 6 months of the date of final approval of this report. Within 18 months of the date of approval, modifications to the structure deemed necessary as a result of the stability analysis should be made. Other deficiencies outlined should be corrected within 1 year of the date of approval of this report.

7.2 RECOMMENDED MEASURES

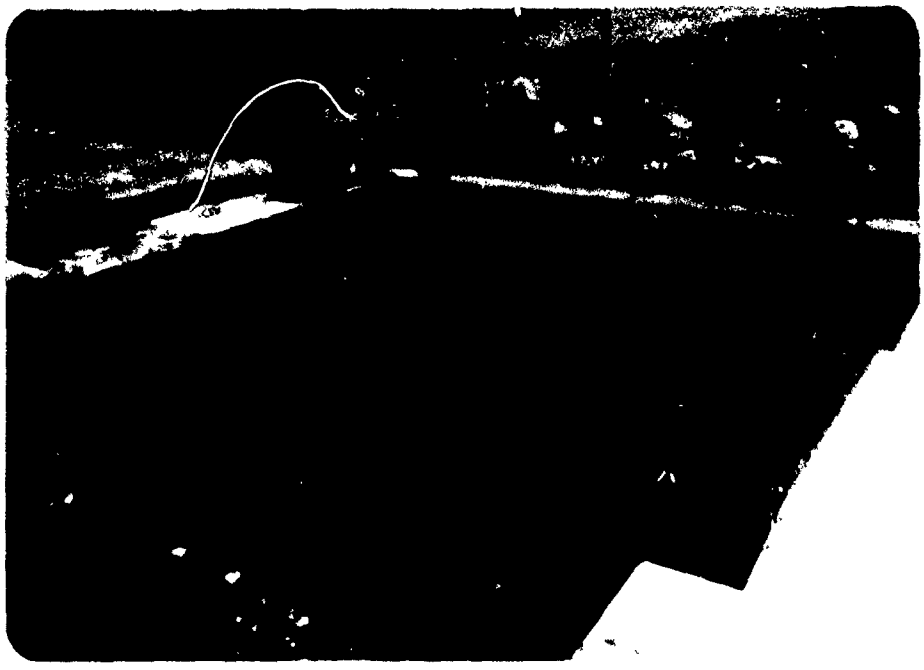
a. After the structural stability analysis has been completed, appropriate remedial work should be performed.

b. Joints between blocks of masonry which are missing mortar should be repointed.

c. Small gullies and erosion on the downstream slope of the abutments and on the west bank of the downstream channel should be regraded.

APPENDIX A

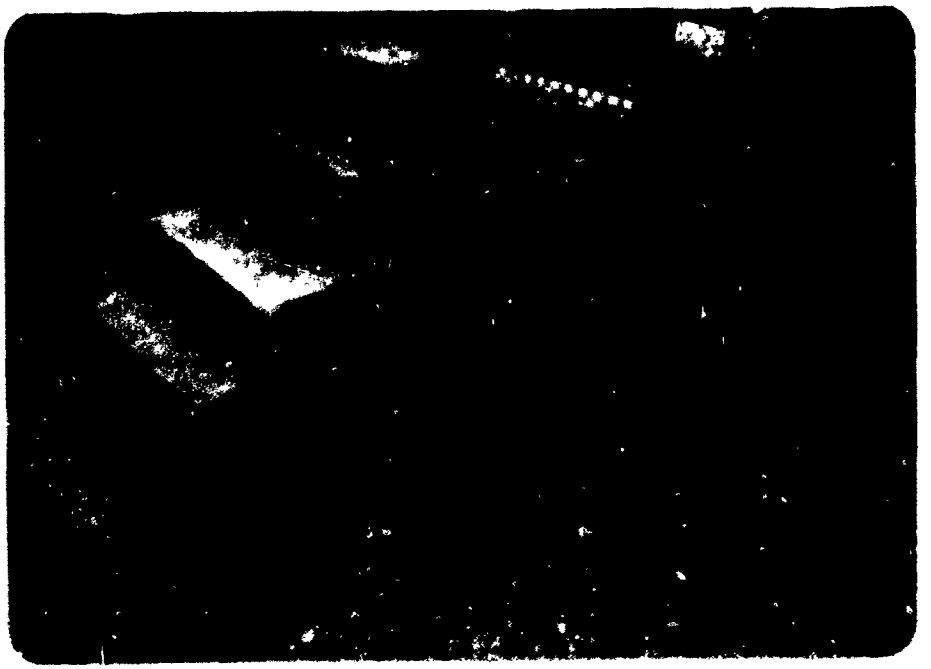
PHOTOGRAPHS



Trashrack at Inlet to Principal Spillway

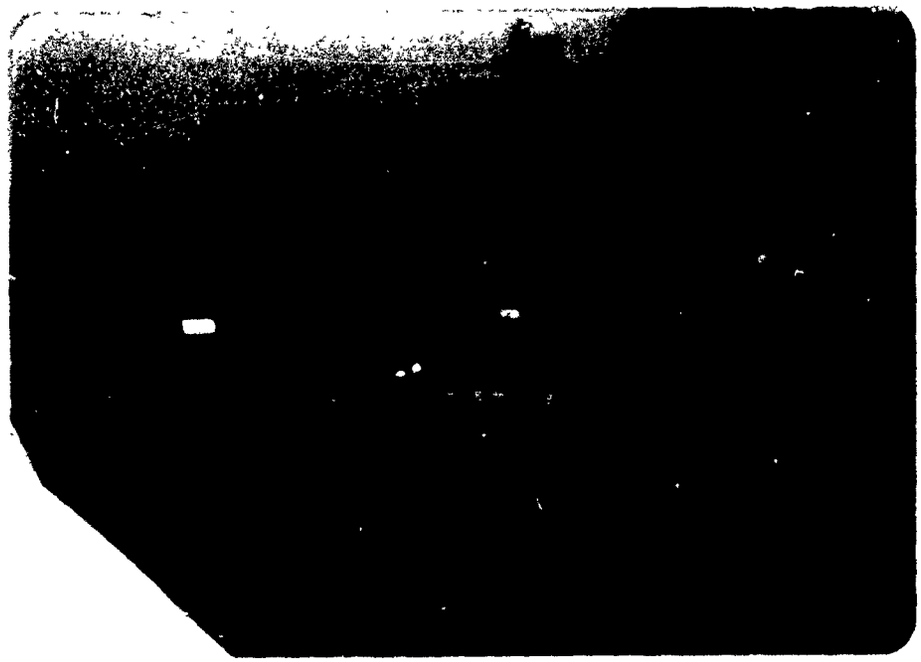
Tainter Gate - Principal Spillway Outlet

Principal Spillway, Note Gully at Right



Close-up of Erosion at Western Abutment

Erosion Gully at Eastern Abutment



Stop-gates and Lifting Devices on Auxiliary Spillway

APPENDIX B

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam OWASCO LAKE OUTLET

I.D. # N.Y. 776

Location: ~~Town~~ City - AUBURN County CAYUGA

Stream Name OWASCO LAKE OUTLET

Tributary of _____

Latitude (N) _____ Longitude (W) _____

Hazard Category C

Date(s) of Inspection 8/2/79

Weather Conditions 80° SUNNY

b. Inspection Personnel R.WARRENDER, W. LYNCK

c. Persons Contacted MICHAEL O'NEIL, CITY ENGINEER

d. History:

Date Constructed 1836 - RECONSTRUCTED 1972

Owner CITY OF AUBURN

Designer of RECONSTRUCTION - O'BRIEN & GERE

Constructed by _____

2) Technical Data

Type of Dam CONCRETE CAP OVER MASONRY [redacted]

Drainage Area _____

Height 135 ft Length 90 ft

Upstream Slope _____ Downstream Slope _____

4) Instrumentation

(1) Monumentation/Surveys

(2) Observation Wells

(3) Weirs

(4) Piezometers

(5) Other

5) Reservoir

a. Slopes - OWASCO LAKE

b. Sedimentation NONE APPARENT

6) Spillway(s) (Including Discharge Conveyance Channel)

PRIMARY WITH TAINTER GATE - 5 SECTION OVERFLOW SECTION FOR AUXILIARY WITH STOP GATES

a. General NEW CONCRETE FACINGS OVER MASONRY — JOINTS OF MASONRY OKAY - SOME NEED REPOINTING

b. Principle Spillway TAINTER GATE - APPEARS TO BE CORRUGATED METAL SHEETS HELD BY RADIAL ANGLE PIECES STRUCTURALLY SATISFACTORY

c. Emergency or Auxiliary Spillway CONCRETE CAP ON MASONRY FORMS CREST - STOP GATES IN PLACE ON ALL SECTIONS SATISFACTORY CONDITION

d. Condition of Discharge Conveyance Channel - NATURAL CHANNEL EAST SIDE - RIP-RAP LINED WITH ± 50' BEYOND END OF EAST ABUTMENT WALL. WEST SIDE - EARTH FILL ON STEEP SLOPE - EROSION EVIDENT THROUGH STONE ON SLOPE

e. Stability of Channel side/slopes EAST - SATISFACTORY WEST - STEEP IN AREA OF BACKFILL (1:1)

7) Downstream Channel

a. Condition (debris, etc.) NONE - SLOUGHING & EROSION GULLIES ON WEST SIDE

b. Slopes EAST - LOW - WOODED TO EDGE
WEST - SLOUGHING & GULLIES

c. Approximate number of homes CITY OF AUBURN

8) Reservoir Drain/Outlet - NONE - OTHER THAN PRINCIPAL SPILLWAY

Type: Pipe _____ Conduit _____ Other _____

Material: Concrete _____ Metal _____ Other _____

Size: _____ Length _____

Invert Elevations: Entrance _____ Exit _____

Physical Condition (describe): Unobservable _____

Material: _____

Joints: _____ Alignment: _____

Structural Integrity: _____

Hydraulic Capability: _____

Means of Control: Gate _____ Valve _____ Uncontrolled _____

Operation: Operable _____ Inoperable _____ Other _____

Present Condition (describe): _____

9) Structural

a. Concrete Surfaces SATISFACTORY

b. Structural Cracking NONE ON CONCRETE MASONRY - SOME JOINTS NEED REPOINTING

c. Movement - Horizontal & Vertical Alignment (Settlement) NONE

d. Junctions with Abutments or Embankments SATISFACTORY UPSTREAM DOWNSTREAM - SOME MATERIAL REMOVAL BEHIND STEPPED WALL ON EAST - LARGE DUMPED STONE - SOME EROSION HAS OCCURRED ON WEST

e. Drains - Foundation, Joint, Face NONE

f. Water passages, conduits, sluices SATISFACTORY

g. Seepage or Leakage MINOR LEAKAGE UNDER STOPGATES NO LEAKAGE BETWEEN BLOCKS OF MASONRY

h. Joints - Construction, etc. SATISFACTORY

i. Foundation OKAY

j. Abutments SATISFACTORY EXCEPT FOR SLIGHT EROSION ON DOWNSTREAM SLOPE - NATURAL SOIL & EMBANKMENT BEYOND EITHER END

k. Control Gates SATISFACTORY

l. Approach & Outlet Channels

m. Energy Dissipators (plunge pool, etc.) RIPRAP IN NATURAL CHANNEL

n. Intake Structures TRASHRACK - SATISFACTORY

o. Stability

p. Miscellaneous SHEET PILING - INTERLOCK & ALIGN. OKAY CANAL AT SIDE - UPSTREAM FILLED IN WITH SOIL & SHEET PILING AT UPSTREAM END - DOWNSTREAM CANAL IS STILL IN SATISFACTORY CONDITION

APPENDIX C

HYDROLOGIC/HYDRAULIC ENGINEERING DATA AND COMPUTATIONS

OWASCO LAKE OUTLET DAM
"STATE DAM" NY-776

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam - WEST ABUT.	716.5	—	60,222
2) Design High Water (Max. Design Pool)	NA		
3) Auxiliary Spillway Crest	710.72	6400	17,712
4) [redacted]			
5) Service Spillway Crest			
TAINTER GATE < TOP	706.45	—	—
TAINTER GATE < INVERT	699.45		

DISCHARGES

	Volume (cfs)
1) Average Daily	VARIES
2) Spillway @ Maximum High Water	
3) Spillway @ Design High Water	
4) Spillway @ Auxiliary Spillway Crest Elevation	
5) Low Level Outlet	
6) Total (of all facilities) @ Maximum High Water	
7) Maximum Known Flood - @ ELEV 716.88	NA
8) At Time of Inspection WATER SURFACE @ ELEV. 712.8	NA

CREST: ELEVATION: 116.5

Type: STEEL SHEET PILING w/ EARTH BACKFILL

Width: VARIES Length: 258 FT

Spillover MASONRY STRUCTURE CAPPED w/ CONCRETE ; TAINTER GATE & 5 SLUICE GATES

Location CENTER - 113 FT

SPILLWAY:

PRINCIPAL		AUXILIARY
TOP @ 706.45 INVERT @ 699.45	Elevation	CREST @ 710.72 TOP @ 713.27
TAINTER GATE	Type	5 GATES 2.55' HIGH
13.7'	Width	NET - 87'

Type of Control

Uncontrolled

Controlled:

MECHANICAL LIFT DEVICE	Type	MECHANICAL LIFT DEVICES ([redacted]; gate)
	Number	
	Size/Length	
	Invert Material	CONCRETE CAP OVER MASONRY
	Anticipated Length of operating service	
	Chute Length	NA
SAME	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	10' (±)

HYDROMETEROLOGICAL GAGES: USGS UPSTREAM - #04235396 | USGS #04235500 - DOWNSTREAM

Type : NON-RECORDING | WATER-STAGE RECORDER

Location: 1.8 MILES UPSTREAM FROM DAM | 4 MILES DOWNSTREAM FROM DAM

Records:

Date - 1912 TO PRESENT | NOV. 1912 TO PRESENT

Max. Reading - (DATUM = MSL) ELEV. 716.88 6/25/72 | Q = 3250 cfs ELEV. 540.2 6/23/72

FLOOD WATER CONTROL SYSTEM:

Warning System: NA

Method of Controlled Releases (mechanisms):

TAINTER GATE $\frac{1}{1}$ SLUICE GATES IN ACCORDANCE WITH CORPS OF ENGRS OEM MANUAL SEPT. 1961

DRAINAGE AREA: 207 SQ MILES

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: FORESTED & FARMLAND

Terrain - Relief: STEEP

Surface - Soil: RELATIVELY PERMEABLE SCS - SOIL GROUP B - HOWESVILLE & LANSING C - LANGFORD

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

NA

Potential Sedimentation problem areas (natural or man-made; present or future)

NA

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

HOMES & LAKESIDE FACILITIES IMMEDIATELY SURROUNDING OCASCO LAKE (ABOVE ELEV. 715)

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

Location: NA

Elevation:

Reservoir:

Length [redacted] - OCASCO LAKE (10) + FLOODWAY CHANNEL (1.8) 11.8 (Miles)

Length of Shoreline (@ Spillway Crest) > 23.6 (Miles)

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
QUASCO LAKE OUTLET DAM	1/		
SUBJECT		COMPUTED BY	DATE
		WCL	9/4/79

DRAINAGE AREA:

[CORPS ENGRS DES MEMO 5/1960] QUASCO LAKE = 20± SQ MILES

LAKE SURFACE = 10 SQ MILES

DISTANCE TO DAM = 1.8 MILES

TOTAL " TO OUTLET = 17 MILES TOTAL ADDITIONAL AREA TO OUTLET = 21 SQ MILES

ADDITIONAL DR. AREA (LAKE TO DAM) = ?

$\frac{1.8}{17} \cdot \frac{DA}{21} \Rightarrow$ DA = 2.2 SQ MILES

TOTAL AREA (DAM) = 206.2 SQ MILES

[USGS WATER DATA REPORT 74-1 1977]

GAGE @ QUASCO 53% 1.8 MILES UPSTREAM FROM DAM DA = 205 SQ MILES

+ 21.2

207.2 SQ MILES

USE 207 SQ MILES ←

TRANSMISSION FACTOR: $TF = 1 - \frac{0.3DB}{(DA)^{.718}}$

$TF = 0.383$

I.D. * NY-776

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207

NEW YORK STATE

NCBED-PH

14 July 1975

George Koch, Senior Hydraulic Engineer
Bureau of Facilities & Construction Mgmt.
New York State Dept. of Environmental
Conservation
50 Wolf Road
Albany, NY 12233

Dear Mr. Koch:

This is in reply to your letter, dated 25 June 1975, requesting available hydrologic and hydraulic data for Owasco Lake and Outlet.

A search of our files revealed that we have not determined an outlet capacity or a spillway design flood for the State Dam. However, rating curves and stage, storage, area, and outflow data have been developed under the direction of Mr. Allan Tedrow, Chief, Program Development Group, New York State Department of Environmental Conservation. I suggest you contact Mr. Tedrow regarding these data.

In June 1962, a local flood protection project was completed on Owasco Lake Outlet. Inclosure 1 is a copy of the Design Memorandum, dated May 1960, for this project. Improvements to the State Dam discussed in this memorandum were to have been made by local interests.

I am also inclosing unit and standard project flood hydrograph data for Owasco Lake developed by the Buffalo District under the Section 214 Program. These data may be of use to you in determing a spillway design flood inflow hydrograph. Flood routings can then be accomplished using Mr. Tedrow's stage-storage data to determine the resultant outflow.

I trust this information will be of assistance to you.

Sincerely yours,

BERNARD C. HUGHES
Colonel, Corps of Engineers
District Engineer

Incl
as stated

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

OSWEGO BASIN-STANDARD-PROJECT STORM CENTERED ON SUB-BASIN C
DEVLPMNT OF FLOOD HYD. GRAPH ON AREA C-1 (OWASCO SF) D.A.=201SM
TC,R FROM GENRL/D STUDY OF OSWEGO DSN 23-JA-1211

ISTA	NHR	NUNGO	NCLRH	IPNCH	ORCSN	FXIA	RTIMP
-0	1	56	-0	-0	-0	1.50	.047

DT	TR	TP	CP	TC	RTIOR	RTIOL	RCVRY	E
201.00	60.00	-0.00	-0.000	-0.00	1.00	-0.00	-0.00	-0.00

STANDARD PROJECT FLOOD HYDROGRAPH ON AREA C-1
UNIFORM LOSS RATE INITIAL LOSSES

NP	BASEL	DELTAL	STARTQ	STORM	SPFF	PMS	TWSPC	TRSDA
96	.02	.50	121	-0.00	9.50	-0.00	1.000	606.00

HR	MIN	RAIN	LOSS	EXCESS	UNIT HG	RECSN	FLOW
1	0	0.00	0.00	0.00	21353	121	121
2	"	0.00	0.00	0.00	6351	121	121
3	"	0.00	0.00	0.00	1989	121	121
4	"	0.00	0.00	0.00	2517	121	121
5	"	0.00	0.00	0.00	3250	121	121
6	"	0.00	0.00	0.00	4340	121	121
7	"	.01	.01	0.00	5353	121	121
8	"	.01	.01	0.00	5916	121	121
9	"	.01	.01	0.00	6153	121	121
10	"	.01	.01	0.00	6176	121	121
11	"	.01	.01	0.00	5971	121	121
12	"	.01	.01	0.00	5700	121	121
13	"	.03	.03	0.00	5398	121	121
14	"	.03	.03	0.00	6948	121	121
15	"	.04	.04	0.00	4468	121	121
16	"	.10	.10	0.00	3817	121	121
17	"	.04	.04	0.00	3611	121	121
18	"	.03	.03	0.00	3246	121	121
19	"	0.00	0.00	0.00	2919	121	121
20	"	0.00	0.00	0.00	2624	121	121
21	"	0.00	0.00	0.00	2359	121	121
22	"	0.00	0.00	0.00	2120	121	121
23	"	0.00	0.00	0.00	1906	121	121
24	"	0.00	0.00	0.00	1714	121	121
25	"	.01	.01	0.00	1541	121	121
26	"	.01	.01	0.00	1385	121	121
27	"	.01	.01	0.00	1245	121	121
28	"	.01	.01	0.00	1119	121	121
29	"	.01	.01	0.00	1006	121	121
30	"	.01	.01	0.00	905	121	121
31	"	.03	.03	0.00	813	121	121
32	"	.03	.03	0.00	731	121	121
33	"	.03	.03	0.00	657	121	121
34	"	.03	.03	0.00	591	121	121
35	"	.03	.02	.01	531	121	395
36	"	.03	.02	.01	478	121	398
37	"	.12	.02	.10	429	121	2340
38	"	.14	.02	.12	385	121	3364
39	"	.18	.02	.16	347	121	4556
40	"	.45	.02	.43	312	121	10485
41	"	.17	.02	.15	280	121	7047
42	"	.13	.02	.11	252	121	5617
43	"	.01	.01	0.00	227	121	3897
44	"	.01	.01	0.00	204	121	4146
45	"	.01	.01	0.00	183	121	5065

1-Hr. Unit Hydrograph

SPF INFLOW HYDROGRAPH

INCL 2 LOTS

46	0	.01	.01	0.00	105	121	9851
47	0	.01	.01	0.00	148	121	6309
48	0	.01	.01	0.00	133	121	6701
49	0	.04	.02	.02	120	121	7050
50	0	.04	.02	.02	108	121	6944
51	0	.04	.02	.02	97	121	6720
52	0	.04	.02	.02	87	121	6303
53	0	.04	.02	.02	78	121	6013
54	0	.04	.02	.02	70	121	5629
55	0	.15	.02	.13	63	121	7624
56	0	.15	.02	.13	57	121	8013
57	0	.15	.02	.13		121	7969
58	0	.15	.02	.13		121	8022
59	0	.15	.02	.13		121	8187
60	0	.15	.02	.13		121	8408
61	0	.68	.02	.66		121	20259
62	0	.82	.02	.80		121	27138
63	0	1.02	.02	1.00		121	33914
64	0	2.58	.02	2.56		121	70684 — PEAK
65	0	.95	.02	.93		121	68823
66	0	.75	.02	.73		121	41105
67	0	.08	.02	.06		121	30826
68	0	.08	.02	.06		121	32370
69	0	.08	.02	.06		121	37548
70	0	.08	.02	.06		121	42243
71	0	.08	.02	.06		121	45310
72	0	.08	.02	.06		121	46602
73	0	0.00	0.00	0.00		121	45377
74	0	0.00	0.00	0.00		121	43820
75	0	0.00	0.00	0.00		121	41868
76	0	0.00	0.00	0.00		121	39451
77	0	0.00	0.00	0.00		121	36062
78	0	0.00	0.00	0.00		121	33545
79	0	.01	.01	0.00		121	30479
80	0	.01	.01	0.00		121	27502
81	0	.01	.01	0.00		121	24916
82	0	.01	.01	0.00		121	22481
83	0	.01	.01	0.00		121	20245
84	0	.01	.01	0.00		121	18254
85	0	.05	.02	.03		121	17049
86	0	.06	.02	.04		121	15827
87	0	.07	.02	.05		121	14684
88	0	.13	.02	.11		121	13861
89	0	.06	.02	.04		121	12962
90	0	.05	.02	.03		121	11247
91	0	.01	.01	0.00		121	9808
92	0	.01	.01	0.00		121	9148
93	0	.01	.01	0.00		121	8662
94	0	.01	.01	0.00		121	8219
95	0	.01	.01	0.00		121	7750
96	0	.01	.01	0.00		121	7237
97	0					121	6723
98	0					121	6199
99	0					121	5643
100	0					121	5204
101	0					121	4729
102	0					121	4278
103	0					121	3862
104	0					121	3465
105	0					121	3145
106	0					121	2839

INCL 2 MF3

107						121	2304
108						121	2340
109						121	2113
110						121	1893
111						121	1707
112						121	1541
113						121	1342
114						121	1256
115						121	1134
116						121	1025
117						121	899
118						121	780
119						121	683
120						121	477
121						121	396
122						121	329
123						121	305
124						121	283
125						121	264
126						121	246
127						121	231
128						121	216
129						121	207
130						121	198
131						121	190
132						121	183
133						121	177
134						121	171
135						121	166
136						121	162
137						121	158
138						121	154
139						121	151
140						121	148
141						121	143
142						121	139
143						121	135
144						121	125
145						121	123
146						121	121
147						121	121
148						121	121
149						121	121
150						121	121
151						121	121
TOTAL		14.83	1.45	9.38	129139	18271	1229495

Page 2 of 3

PROJECT GRID

JOB: OWASCO LAKE OUTLET DAM | SHEET NO.: 9/ | CHECKED BY: | DATE:

SUBJECT: HYDROGRAPH PARAMETERS | COMPUTED BY: WCL | DATE: 9/4/79

[CORPS ENGRS DES. MEMO 5/1960]

LAG TIME:

$t_p = C_t (L \times L_{ca})^{0.3}$

L = 30

L_{ca} = 0.5L = 15

$t_p = 4(30 \times 15)^{0.3}$

25% C_t = 4

t_p = 25 HRS

UNIT RAINFALL DURATION:

$t_r = \frac{t_p}{5.5} = \frac{25}{5.5} = 4.55$ HRS

[USE 5 HRS = t_R]

(DESIGN MEMO: USE 3 HRS)

ADJUSTED LAG TIME:

$T_p = t_p + 0.25(t_R - t_r)$

= 25 + 0.25(5 - 4.55)

[CORPS ENGRS DAM MANUAL 9/61: LAG = 24 HRS]

TP = 25.1 HRS

USE C_p = 0.625

SOIL LOSS DATA:

INITIAL LOSS RATE = 1.0"/HR

CONSTANT LOSS RATE = 0.15"/HR ← [CORPS ENGRS DES. MEMO 5/1960]

BASE FLOW: USE 2 cfs/SQ MI OF DA — TOTAL = 414 cfs

PMP-PRECIPITATION:

ZONE	200 SQ MI 24 HR	DURATION - % 24 HR: 6	12	24	48
	21"	75	89	100	106
@ DAM	21"	78	90	100	108
2	21"	80	90	100	110

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
OWASCO LAKE OUTLET DAM	3/		

SUBJECT	COMPUTED BY	DATE
STAGE - STORAGE DATA (LAKE + FLOOD CHANNEL)	WCL	9/4/79

[CORPS ENGRS O&M MANUAL 9/1961]: PLATE A2 - OWASCO LAKE (STORAGE CAPACITY CURVE)

STAGE	STORAGE (PLATE A2) (AC-FT)	CHANNEL STORAGE (SHT 4) EARTH	ROCK	TOTAL (AC-FT)
708.5	3000	68	111	3079
709	6200	74	19	6286
710	12800	97	13	12900
(USGS) 710.72	17700	98	14	17712
711	19500	102	15	19617
712	24600	117	17	24734
713	33400	133	19	33552
714	40800	150	20	40970
715	48400	168	22	48590
716	54000	187	24	54211
716.5				60222
717	64000	207	26	64233

CHANNEL (LAKE TO DAM):

L = 1.3 MILES = 7504'

ROCK SECTION:
L = 1444'
BOT WIDTH = 30'
SIDE SLOPES: 1/4:1H
ELEV INVERT ≈ 700

EARTH SECTION:
L = 6060'
BOT WIDTH = 30'
SIDE SLOPES: 1V:2.5H
ELEV INVERT ≈ 700 - 702 (USE 701)

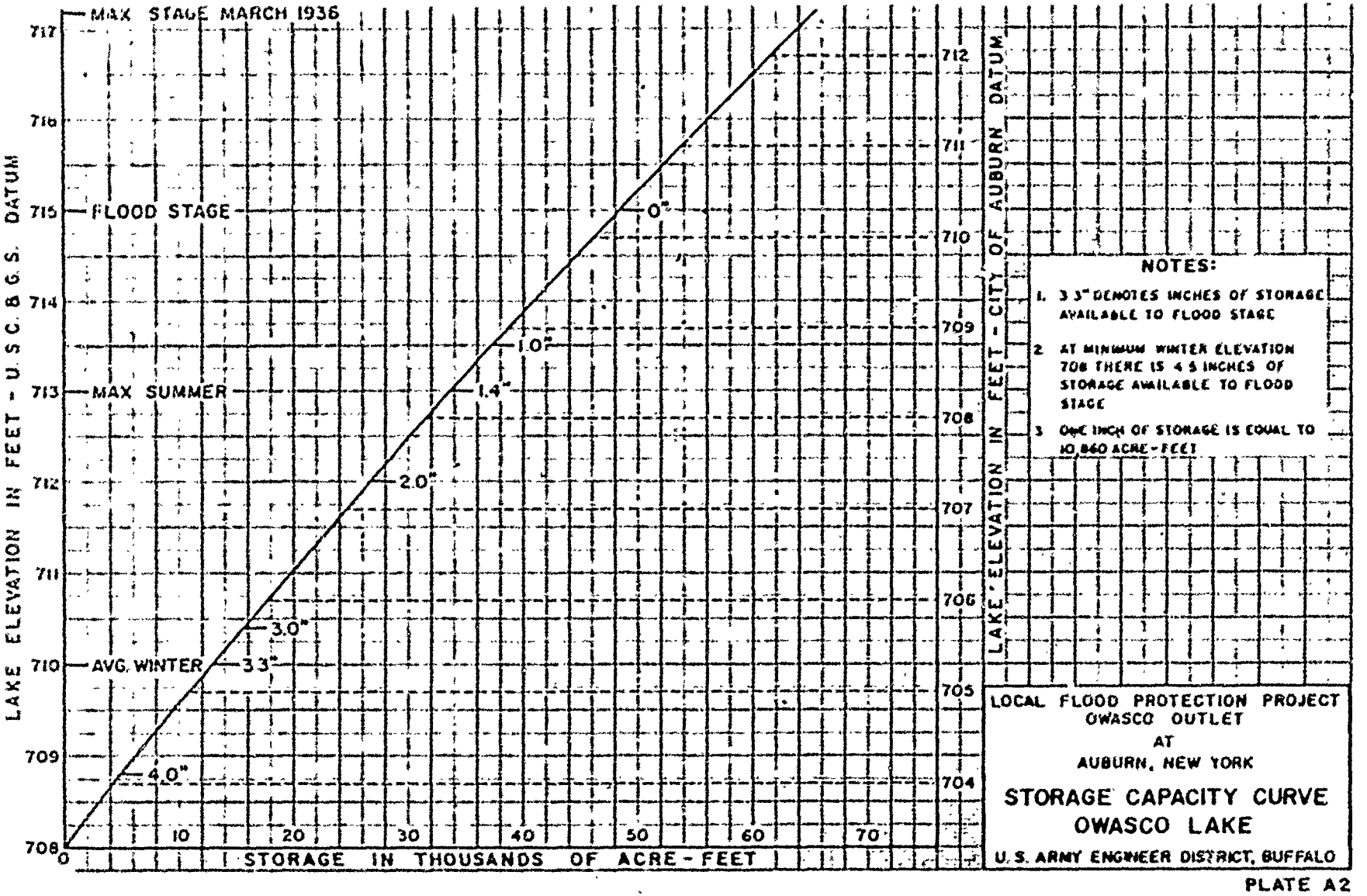


PLATE A2

DAM: NY-776

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
OWASCO LAKE OUTLET DAM	4		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - STORAGE DATA (FLOOD CHANNEL)		WCL	9/4/79

GEOMETRICS - SEE SHT 3/

EARTH SECTION - 1" = 50'-0" ROCK SECTION - 1" = 1'-0"

STAGE	EARTH DEPTH (REF = 701)	EARTH WIDTH	EARTH AREA	EARTH VOL (AC-FT)	ROCK DEPTH (REF = 700)	ROCK TOP WIDTH	ROCK AREA	ROCK VOL (AC-FT)
708.5	7.5	67.5	365.6	68	8.5	47	327.7	11
709	8	70	400	74	9	48	351	12
710	9	75	472.5	87	10	50	400	13
710.72	9.72	78½	527.8	98	10.72	51.4	434.72	14
711	10	80	550	102	11	52	451	15
712	11	85	632.5	117	12	54	504	17
713	12	90	720	133	13	56	559	19
714	13	95	812.5	150	14	58	616	20
715	14	100	910	168	15	60	675	22
716	15	105	1012.5	187	16	62	736	24
717	16	110	1120	207	17	64	799	26

$\frac{L \times AREA}{43560}$ = AC-FT

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

NOT USED

JOB	SHEET NO.	CHECKED BY	DATE
OWASCO LAKE OUTLET DAM	5/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE (CURVE #95 - USGS)		DCL	9/4/79

[CORPS ENGRS O&M MANUAL 9/1961]: PLATE A6 - OWASCO OUTLET (STAGE - DISCHARGE CURVE)

USGS - 4.7 = CURVE (USGS GAGE = 715.48

710.78 = 0 (WATER DATA REPT. 76-1 1977 GAGE #04235200)

(USE 710.8) (CURVE)

STAGE	GAGE HT	DISCHARGE	STAGE	GAGE HT	DISCHARGE
				3.3	980
712.3	1.5	35			
				3.4	1065
	1.6	50			
				3.5	1150
712.5	1.7	70			
				3.6	1240
	1.8	90			
			714.5	3.7	1325
	1.9	115			
				3.8	1410
	2.0	140			
				3.9	1500
	2.1	175			
				4.0	1595
713	2.2	215			
				4.1	1675
	2.3	255			
			715	4.2	1755
	2.4	310			
				4.3	1830
	2.5	390			
				4.4	1895
	2.6	450			
				4.5	1965
713.5	2.7	520			
				4.6	2030
	2.8	595			
			715.5	4.7	2090
	2.9	670			
	3.0	745			
	3.1	825			
714	3.2	910			

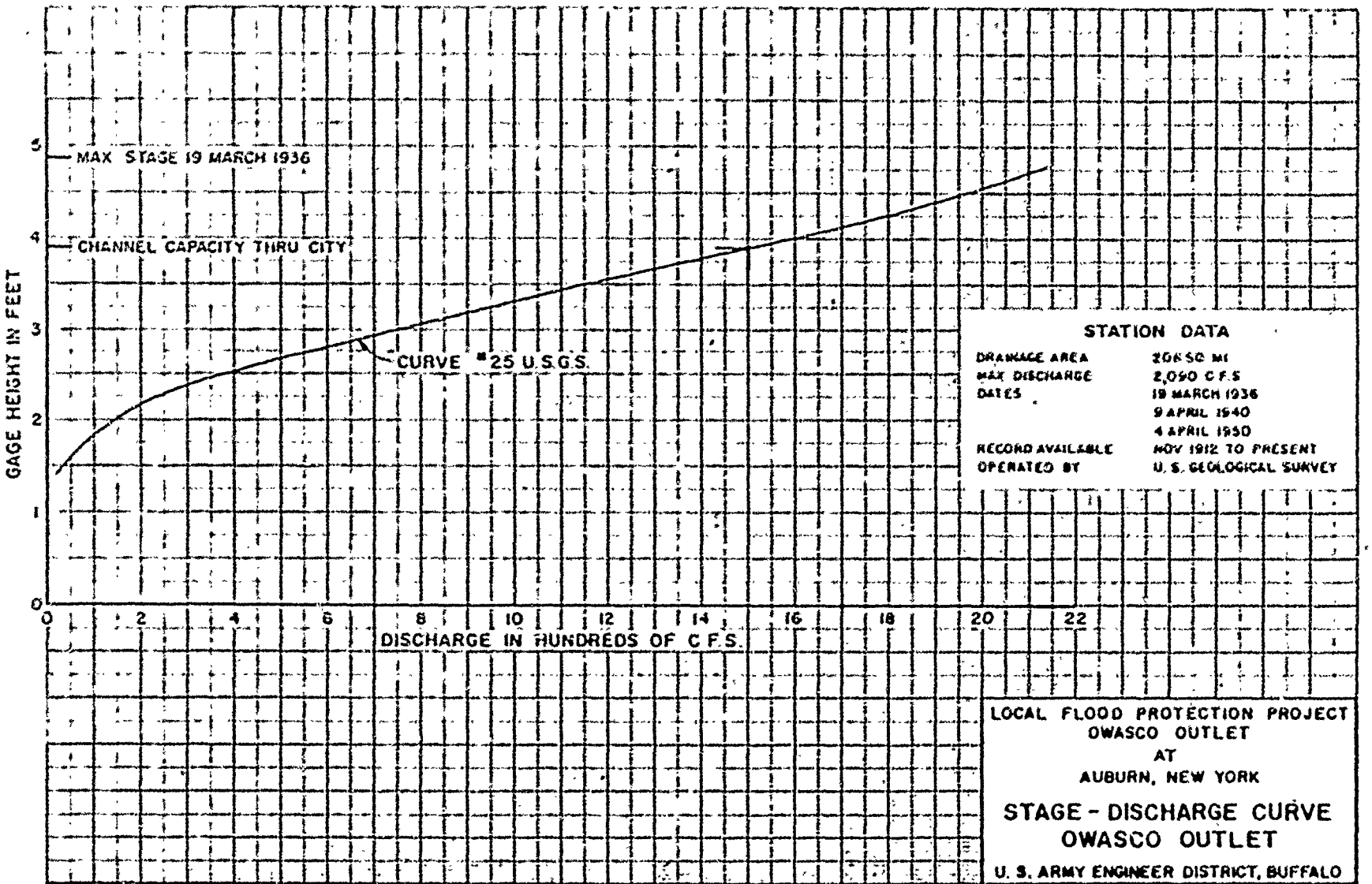
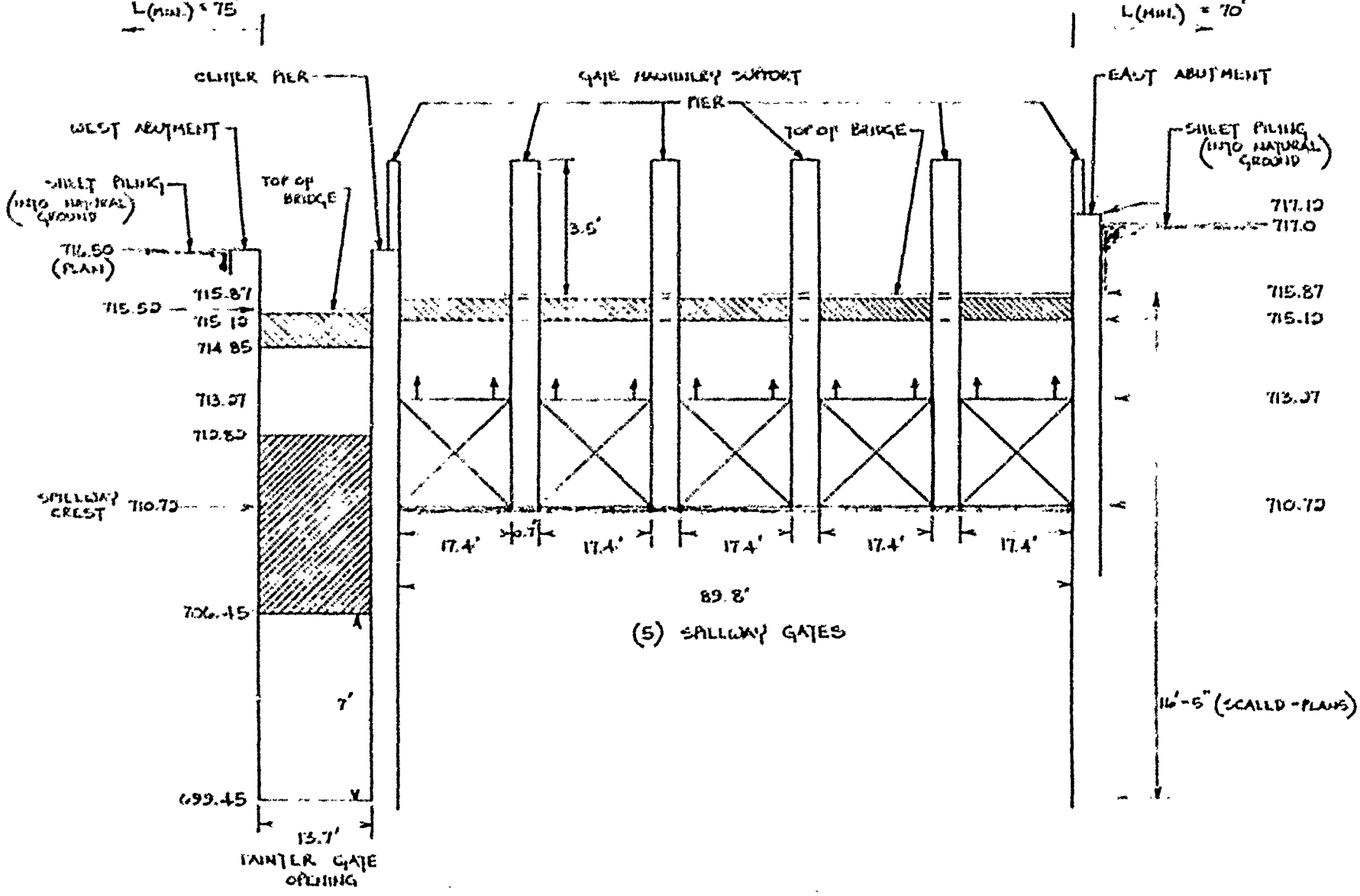


PLATE A4

DAM: NY-776

OWASCO LAKE OUTLET DAM
"SKIE DAM" 114-776
MEASUREMENTS & ELEVATIONS - 8/79



00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
OWASCO LAKE OUTLET DAM	6/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE : TAINTER GATE		JCL	9/5/79

DIMENSIONS & ELEVATIONS

SILL (INVERT / GATE OPENING) = SCALED FROM PLANS

WIDTH = FIELD MEASUREMENT

SILL ELEV. = 700.45

INVERT ELEV. = 699.45

WIDTH W = 13.7'

TOP = 710.72

$Q = CA\sqrt{2gH} = 4.815A\sqrt{H}$

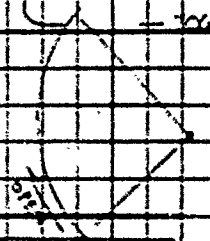
C = 0.6

A = 13.7 H (MAX = 95.9 ft²)

H = MEASURED TO CENTER ELEV. OF OPENING

CONDITION: WATER SURFACE @ 699.45 = DAM CREST = 710.72

(REF = 699.45) ELEV.	OPENING HT	AREA	CENTER ORIFICE ELEV.	(REF = 710.72) H	Q
699.45	—	—		11.27	—
700	0.55	7.54	699.72	11	120
701	1.55	21.24	700.22	10.5	331
702	2.55	34.94	700.72	10	532
703	3.55	48.64	701.22	9.5	732
704	4.55	62.34	701.72	9	900
705	5.55	76.04	702.22	8.5	1067
706	6.55	89.74	702.72	8	1222
706.45	7.0	95.9	702.95	7.77	1287



00-15-1 (1/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
OWASCO LAKE OUTLET DAM	7/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE : TAINTER GATE		WCL	9/5/79

CREST ELEV = 706.45

INVERT ELEV = 699.45

WIDTH H = 13.7' Q = CA√2gH = 461.7√H

@ FULL OPEN: AREA = 95.9 FT² C=0.6

CENTER ORIFICE ELEV = 702.95

710.72

CONDITION: GATE FULLY OPEN; WATER SURFACE @ SPILLWAY CREST & ABOVE

(crest = 706.95)

STAGE	H	Q	STAGE	H	Q
			719	16.05	1850
crest 710.72	3.77	2137			
			720	17.05	1906
711	9.05	1810			
			721	18.05	1962
712	9.06	1899			
			722	19.05	2015
712.32	9.87	1451			
			723	20.05	2067
713	10.05	1464			
713.27	10.32	1483			
714	11.05	1535			
714.95	11.90	1593			
715	12.05	1603			
715.12	12.17	1611			
715.52	12.57	1637			
715.87	12.92	1660			
716	13.05	1668			
716.50	13.55	1700			
716.7	13.75	1721			
716.75	13.80	1726			
716	14.05	1751			

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
OWASCO LAKE OUTLET DAM	8/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE : SPILLWAY GATES		WCL	9/5/79

5 OPENINGS @ 17.4' WIDE = 87' (NET) EACH NET. I BEAM = 0.7' WIDE
4 FLANGES @ 0.7' = 2.8' FLANGE

NO ABUTMENT CONTRACTION 89.8' (TOTAL)

WITH PIER CONTRACTION

$Q = CLH^{3/2}$

$L = L' - 2(NK_p + K_a)H$

N = 4
$K_p = 0.00$
$K_a = 0$

$L' = 89.8'$

$L = 87 - 0.16H$

CONDITION : GATES FULLY OPEN - MAX OPENING HT = 4.9' (ELEV. = 715.5)

BROAD-CRESTED WEIR $C = 3.087$ (MAX) WEIR FLOW

STAGE	H	L	Q
710.00	—	87	—
711	0.28	86.96	39.81
712	1.28	86.80	389.5
712.32	2.10	86.66	814
713	2.28	86.64	921
713.27	2.55	86.59	1088
714	3.28	86.48	1580
714.35	3.63	86.34	2237
715	4.28	86.30	3359
715.10 (BOTTOM GIRDER)	4.40	86.3	3459

USE ORIFICE FLOW
(SHT * 10/)

00-15-1 (3/78)
Formerly CA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
OWASCO LAKE OUTLET DAM	9/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE : GATES (TAINTER & SPILLWAY)		WCL	9/5/79

TAINTER GATE - OPENING ABOVE CONCRETE BAFFLE TO UNDERSIDE OF BRIDGE :

WEIR FLOW - ELEVS. (712.92 TO 714.85)

LOW HEAD ⟹ ELEVS. (714.85 TO 715.52) ← CHECK : USE ORIFICE FLOW FROM ELEV 714.85±

ORIFICE FLOW

ORIFICE FLOW - ELEVS. (±715.52 / 714.85)

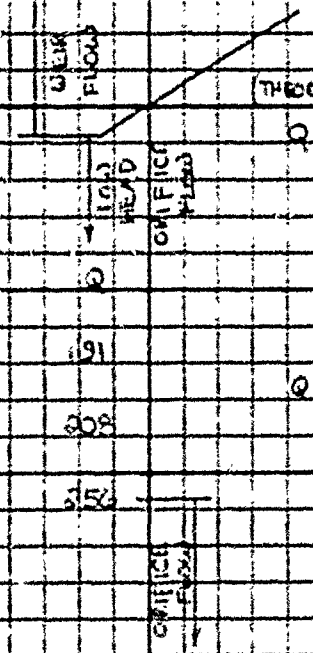
GEOMETRICS:

L = 13.7' NO PIERS ; NO ABUTMENT CONTRACTION

C = 3.1

$Q = CLH^{3/2}$ (WEIR FLOW)

STAGE	H	G
712.92	—	—
713	0.18	3
713.27	0.45	13
714	1.18	54
714.85	2.03	123
714.95	2.03	—
715	2.18	0.15
715.52	2.70	0.67



(THEORETICAL) $Q = \frac{2}{3} L \sqrt{2g} \left(h_2^{3/2} - h_1^{3/2} \right)$

$h = h_2 - H$

$= \frac{2}{3} h_2 L \sqrt{2g} \left(\frac{h_2^{3/2} - h_1^{3/2}}{h_2 - h_1} \right)$

$Q = CA\sqrt{2gh} \left(\frac{h_2^{3/2} - h_1^{3/2}}{h} \right)$ [133.5]

C = 0.6

A = 17.51 (2.03 x 13.7)

h x L

h_1 - USE ELEV = 713.20

h_2 - USE ELEV = 714.85

[DO NOT USE]

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
OWASCO LAKE OUTLET DAM	10/		
SUBJECT		COMPUTED BY	DATE
STAGE - DISCHARGE : GATES (TAINTER & SPILLWAY)		WCL	9/5/79

TAINTER GATE - OPENING ABOVE CONCRETE BAFFLE — ORIFICE FLOW

TOP ELEV = BOTTOM GIRDER = 714.95
BOT ELEV = 712.92
WIDTH = 3.7'
AREA = 37.81
$Q = CA\sqrt{2gH} = 133.9\sqrt{H}$
C = 0.6
CENTER ORIFICE @ ELEV. 713.84

STAGE	H	Q
714.85	1.01	135
715	1.16	144
715.12	1.28	151
715.52	1.68	174
715.87	2.03	191
716	2.16	197
716.5	2.66	218
717	3.16	238
717.5	3.66	256
718	4.16	273

SPILLWAY GATES : 5 VERTICAL LIFT UNITS — MAX. LIFT = 4.9'

SILL @ 17.4' — FULL = 37' — BOT. GATE — TOP GATE
AREA = 417.6 ft² — CLOSED — 710.72 — 718.37
C = 0.6 — FULLY OPEN — 715.52 — 718.67
BOTTOM-ARCH GIRDER — 715.12
CENTER ORIFICE @ ELEV 712.92

(REF = 712.92)

STAGE	H	Q
715.12	2.2	2982
715.52	2.6	3242
715.87	2.95	3453
716	3.08	3529
716.5	3.58	3803
717	4.08	4061

$Q = CA\sqrt{2gH} = 2410.7\sqrt{H}$

ORIFICE FLOW

START	H	Q
715	2.08	3478
718	5.08	5436

00-15-1 (3/78)
Formerly CA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
OWASCO LAKE OUTLET DAM	11/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE : TAINTER GATE - BRIDGE OVERFLOW ABUTMENT OVERFLOW		JCL	9/5/79

WEST ABUTMENT:

BROAD-CRESTED WEIR

$C = 3.087$

$L = 75'$ (MIN)

TOP ELEV. $= 716.50$

$Q = CLH^{3/2}$ ← WEIR FLOW

Q	H	STAGE	H	Q
—	—	716.5		
22	0.5	717	—	—
113	0.92	717.12	0.12	9
238	1.0	717.5	0.5	74
425	1.5	718	1.0	214

EAST ABUTMENT:

BROAD-CRESTED WEIR

$C = 3.087$

$L = 70'$ (MIN)

TOP ELEV. $= 717.0$

$Q = CLH^{3/2}$ ← WEIR FLOW

TAINTER GATE - FLOW OVER ABUTMENT

$L = 12.7'$

$C = 3.087$

$Q = CLH^{3/2}$

STAGE	H	Q
715.52	—	—
715.87	0.35	9
716	0.48	14
716.5	0.98	41
717	1.48	74
717.5	1.98	118
718	2.48	165

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB: OWASCO LAKE OUTLET DAM
SHEET NO.: 12/
CHECKED BY:
DATE:

SUBJECT: STAGE-DISCHARGE SUMMARY - ALL GATES FULLY OPEN
COMPUTED BY: WCL
DATE: 9/6/79

[illegible]	[illegible]	SPILLWAY Open Orifice	SPILLWAY Half Gate [illegible]	TAINTER GATE OPENING Below Bridge	TAINTER GATE OPENING Above Bridge	ABUTMENTS West	ABUTMENTS East	TOTAL
110.[illegible]	1237	[illegible]						1287
111	1310	40						1350
111.[illegible]	1320	424						1717
111.[illegible]	13[illegible]1	814		0				[illegible]
112	1344	921		3				2288
112.[illegible]	1384	1088		13				[illegible]
113	1385	1284		54				3175
113.[illegible]	1592	2137		122				[illegible]
113.[illegible]	1602	2452		144				4176
114.[illegible]	1611	2459		151				4221
114.[illegible]	1627	3243		174	0			5253
114.[illegible]	1640	3453		191	9		(ANALYSIS) TOP-OF DAM	5212
115	1643	3529		197	14			[illegible]
115.[illegible]	1650	[illegible]		218	41	0		[illegible]
117	1721	4061		232	76	82	0	6188
117.[illegible]	1741	4222	ABOVE ELLY 718.21	256	118	232	76	6716
118	1791	4530		273	165	435	216	7402

```
****************************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
  MODIFIED FOR HONEYWELL APR 79
****************************************

****************************************
THIS PROGRAM IS CURRENTLY BEING MODIFIED
TO RUN ON THE USGS HONEYWELL SYSTEM

PLEASE REPORT ANY UNUSUAL OPERATING PROBLEMS
TO MIKE FILLSBURY (RM. 423) PH. 2-5020
****************************************
   1     A OWASCO LAKE OUTLET DAM NY-776                      OSWEGO RIVER BASIN
   2     A                                                    CAYUGA COUNTY
   3     A        1-HOUR                                      PMF - CORPS SPF UH
   4     B    160      1      0      0      0      0      0      0      0      0
   5     B1     5

   6     J      1      2      1

   7     J1     1      2

   8     K      0      1                                1

   9     K1                   INFLOW HYDROGRAPH

  10     M     -1           207           207   0.88                  1

  11     N    121    121    121    121    121    335    398   2340   3364   4556

  12     N  10885   7097   5617   3897   4166   5055   5851   6309   6701   7050

  13     N   6984   6720   6393   6013   5629   7624   8013   7969   8022   8187

  14     N   8498  20259  27134  33914  70664  46823  41105  30826  32370  37598

  15     N  42243  45310  46692  45377  43820  41868  39451  36602  33545  30479

  16     N  27582  24916  22481  20265  18254  17069  15827  14684  15861  12942

  17     N  11297   9898   9148   8662   8219   7750   7237   6723   6199   5693

  18     N   5204   4729   4278   3862   3485   3144   2839   2564   2340   2117

  19     N   1893   1707   1541   1392   1255   1134   1025    899    780    663

  20     N    477    394    329    305    283    264    246    231    216    207

  21     N    198    190    183    177    171    166    162    158    154    151

  22     N    148    143    139    135    125    123    121    121    121    121

  23     N    121    121    121    121    121    121    121    121    121    121

  24     N      0

  25     N      0
```

```
K1                    ROUTED HYDROGRAPH AT DAM - NO BREACH  ALL GATES-FULL OPEN
Y                                  1         1
Y1     3                                             -710.72      -1
Y4710.72      711      712   712.84     713  713.27      714  714.85     715  715.12
Y4 715.5   715.87      716    716.3     717   717.5      718
Y5  1287     1350     1777     2265    2366    2584     3175    3953    4106    4221
Y5  5053     5313     5400     5763    6188    6670     7156
$S  6280    12900    17712    19917   26734   33752    40970   46590   56211   64233
$E   709      710   710.72      711     712     713      714     715     716     717
$$710.72
$D   717    3.067      1.5       75
K     99
A
A
A
A
A
```

****
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
MODIFIED FOR HONEYWELL APR 79
****

*****
THIS PROGRAM IS CURRENTLY BEING MODIFIED
TO RUN ON THE DCS HONEYWELL SYSTEM

PLEASE REPORT ANY UNUSUAL OPERATING PROBLEMS
TO THE TILLSUT (RM. 423) PH: 7-5000
****

RUN DATE 09/12/79

OWASCO LAKE OUTLET DAM NY-776

OSWEGO RIVER BASIN
CAYUGA COUNTY
PMF - CORPS SPF UH

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
160	1	0	0	0	0	0	0	0	0
			JOPER	NRT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 2 LRTIO= 1

RTIOS= 1.00 2.00

****

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
-1	0	207.00	0.	207.00	0.88	0.	0	1	0

INPUT HYDROGRAPH

121.	121.	121.	121.	121.	335.	398.	2340.	3364.	4556.
10585.	7397.	5617.	3697.	4166.	5055.	5851.	6309.	6701.	7050.
6984.	6723.	6393.	6313.	5629.	7624.	8013.	7969.	8022.	8187.
8498.	29259.	27138.	33914.	76694.	68323.	41105.	30826.	32370.	37098.
4,243.	45315.	46692.	45377.	43820.	41868.	39491.	36602.	33545.	30479.
27582.	24916.	22481.	20265.	18254.	17069.	15827.	14684.	15861.	12942.
11297.	9898.	9148.	8662.	8219.	7759.	7237.	6723.	6199.	5693.
5204.	4729.	4276.	3862.	3485.	3144.	2839.	2564.	2340.	2117.
1893.	1707.	1541.	1392.	1256.	1134.	1025.	899.	780.	663.
477.	394.	329.	305.	283.	264.	246.	231.	216.	207.
198.	190.	183.	177.	171.	166.	162.	158.	154.	151.
140.	143.	139.	135.	125.	123.	121.	121.	121.	121.
121.	121.	121.	121.	121.	121.	121.	121.	121.	121.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	70684.	43936.	35834.	16723.	1227050.
CMS	2002.	1246.	1015.	474.	34746.
INCHES		1.98	6.44	9.02	9.19
MM		50.21	163.51	229.07	233.43
AC-FT		21811.	71075.	99511.	101409.
THOUS CU M		26904.	87670.	122745.	125086.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

121.	121.	121.	121.	121.	335.	398.	2340.	3364.	4556.
10889.	7077.	5017.	3997.	4166.	5059.	5951.	6394.	6701.	7050.
6984.	6720.	6393.	6013.	5629.	7024.	8013.	7969.	8022.	8187.
8498.	20459.	27138.	33914.	39684.	48823.	41105.	30826.	32370.	37598.
42643.	45310.	46492.	45377.	43820.	41858.	39491.	36602.	33545.	30479.
27582.	24910.	22481.	20469.	18254.	17004.	15627.	14064.	15361.	12942.
11297.	9898.	9143.	8607.	8219.	7750.	7237.	6723.	6199.	5693.
5204.	4729.	4279.	3862.	3485.	3144.	2839.	2564.	2340.	2117.
1893.	1707.	1541.	1392.	1268.	1134.	1025.	899.	780.	663.
477.	394.	329.	305.	283.	264.	248.	231.	216.	207.
198.	190.	183.	177.	171.	168.	162.	158.	154.	151.
148.	144.	139.	135.	125.	123.	121.	121.	121.	121.
121.	121.	121.	121.	121.	121.	121.	121.	121.	121.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	70684.	43936.	35834.	16723.	1227050.
CMS	2002.	1246.	1015.	474.	34746.
INCHES		1.98	6.44	9.02	9.19
MM		50.21	163.51	229.07	233.43
AC-FT		21811.	71075.	99511.	101409.
THOUS CU M		26904.	87670.	122745.	125086.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

242.	242.	242.	242.	242.	670.	796.	4680.	6728.	9112.
21773.	14194.	11234.	7994.	8332.	10118.	11902.	12618.	13402.	14100.
13968.	14440.	12786.	12026.	11258.	15248.	16026.	15938.	16044.	16374.
16995.	40918.	54276.	67828.	141368.	97646.	82210.	61652.	64740.	75196.
84485.	90620.	92384.	90754.	87640.	83736.	78962.	73204.	67090.	60758.
59164.	49832.	44062.	40530.	36508.	34134.	31654.	29368.	31722.	25864.
23594.	19796.	18296.	17324.	16438.	15508.	14474.	13446.	12398.	11386.
10438.	9458.	8556.	7724.	6970.	6288.	5678.	5128.	4680.	4234.
3786.	3414.	3062.	2784.	2512.	2264.	2050.	1798.	1560.	1326.
954.	788.	658.	610.	566.	528.	492.	462.	432.	414.
396.	380.	366.	354.	342.	332.	324.	316.	308.	302.
296.	290.	278.	270.	250.	246.	242.	242.	242.	242.
242.	242.	242.	242.	242.	242.	242.	242.	242.	242.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	141368.	87971.	71667.	33447.	2454099.
CMS	4003.	2491.	2029.	947.	69492.
INCHES		3.95	12.88	18.04	18.38
MM		100.41	327.22	458.13	466.87
AC-FT		43622.	142150.	199022.	202818.
THOUS CU M		53807.	175339.	245490.	250172.

HYDROGRAPH ROUTING

ROUTED HYDROGRAPH AT DAM - NO BREACH ALL GATES-FULL OPEN

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.	0.	0.	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
3	0	0	0. 0.		0.	-711.	-1

STAGE	710.72	711.00	712.00	712.42	713.00	713.27	714.00	714.85	715.00	715.12
	715.50	715.87	716.00	716.50	717.00	717.50	718.00			
FLOW	1287.00	1290.00	1777.00	2465.00	2388.00	2584.00	3175.00	3953.00	4106.00	4221.00
	5053.00	5313.00	5408.00	5763.00	6188.00	6670.00	7186.00			
CAPACITY=	6286.	12900.	17714.	19917.	26724.	33752.	40970.	48390.	56211.	64233.
ELEVATION=	709.	710.	711.	711.	712.	713.	714.	715.	716.	717.

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
710.7	0.	0.	3.	0.	0.	0.	0.

DAM DATA

TOPEL	COOD	EXPD	DAMWID
717.0	3.1	1.5	70.

STATION 1, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.
1294.	1312.	1324.	1339.	1338.	1346.	1363.	1387.	1413.	1442.
1470.	1498.	1524.	1548.	1570.	1597.	1629.	1662.	1694.	1727.
1761.	1844.	1997.	2196.	2595.	3122.	3532.	3952.	4144.	4769.
5229.	5520.	5825.	6175.	6603.	7068.	7529.	7964.	8362.	8717.
9027.	9294.	9519.	9707.	9859.	9984.	10087.	10171.	10253.	10321.
10351.	10354.	10341.	10317.	10287.	10249.	10205.	10153.	10093.	10026.
9953.	9873.	9787.	9697.	9601.	9502.	9400.	9295.	9189.	9081.
8972.	8863.	8752.	8642.	8532.	8422.	8313.	8205.	8097.	7989.
7882.	7775.	7670.	7566.	7464.	7364.	7266.	7170.	7077.	6985.
6895.	6807.	6723.	6644.	6567.	6492.	6419.	6348.	6280.	6214.
6158.	6105.	6053.	6002.	5950.	5900.	5849.	5799.	5752.	5711.
5670.	5630.	5590.	5550.	5510.	5471.	5432.	5392.	5350.	5309.
5270.	5230.	5190.	5151.	5112.	5073.	4995.	4878.	4764.	4652.
4543.	4436.	4332.	4230.	4181.	4138.	4095.	4050.	4005.	3961.
3921.	3882.	3844.	3806.	3768.	3731.	3694.	3658.	3622.	3586.

STORAGE

17616.	17520.	17424.	17328.	17232.	17145.	17069.	17076.	17205.	17425.
17955.	18591.	19307.	19291.	19509.	19779.	20118.	20507.	20929.	21379.
21838.	22282.	22699.	23085.	23437.	23853.	24366.	24890.	25412.	25940.
26485.	27524.	29324.	31673.	34798.	40500.	43941.	46609.	48889.	51412.
54296.	57472.	60305.	64113.	67271.	70247.	73804.	75507.	77731.	79671.
81337.	82749.	83930.	84902.	85685.	86325.	86855.	87278.	87697.	88037.
88184.	88204.	88136.	88019.	87865.	87678.	87450.	87186.	86883.	86543.
86168.	85759.	85319.	84850.	84356.	83841.	83307.	82757.	82196.	81626.
81045.	80457.	79863.	79266.	78665.	78064.	77461.	76858.	76254.	75649.
75043.	74429.	73821.	73217.	72621.	72030.	71447.	70870.	70300.	69736.

[illegible]	[illegible]	[illegible]	[illegible]	61972.	61510.	61036.	60564.	60090.	59633.
[illegible]	58711.	58262.	57812.	57365.	56921.	56470.	56043.	55610.	55181.
[illegible]	54110.	53816.	53450.	53038.	52615.	52200.	51792.	51393.	51004.
[illegible]	50253.	[illegible]	49237.	[illegible]	48546.	48506.	48169.	47836.	47507.
47182.	46857.	46540.	46224.	45911.	45601.	45294.	44990.	44689.	44391.

STAGE

710.7	710.7	710.7	710.7	710.6	710.6	710.6	710.6	710.6	710.7
710.8	710.8	710.9	710.9	710.9	711.0	711.0	711.1	711.1	711.2
711.3	711.3	711.4	711.5	711.5	711.6	711.7	711.7	711.8	711.9
712.0	712.1	712.4	712.7	713.3	713.9	714.4	714.7	715.0	715.4
715.7	716.4	716.5	717.0	717.4	717.7	718.1	718.4	718.7	718.9
719.1	719.3	719.5	719.6	719.7	719.8	719.8	719.9	719.9	720.0
720.0	720.0	720.0	720.0	719.9	719.9	719.9	719.9	719.8	719.8
719.7	719.7	719.6	719.6	719.5	719.4	719.4	719.3	719.2	719.2
719.1	719.0	718.9	718.9	718.8	718.7	718.6	718.6	718.5	718.4
718.3	718.3	718.2	718.1	718.0	718.0	717.9	717.8	717.8	717.7
717.6	717.5	717.5	717.4	717.3	717.3	717.2	717.2	717.1	717.0
717.0	716.9	716.8	716.8	716.7	716.7	716.6	716.5	716.5	716.4
716.4	716.3	716.3	716.2	716.1	716.1	716.0	716.0	715.9	715.9
715.8	715.8	715.7	715.6	715.6	715.5	715.5	715.4	715.4	715.3
715.3	715.2	715.2	715.1	715.1	715.0	715.0	714.9	714.9	714.9
714.8	714.8	714.7	714.7	714.6	714.6	714.6	714.5	714.5	714.4

PEAK OUTFLOW IS 10354. AT TIME 62.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	10354.	10315.	10026.	8375.	903059.
CMS	293.	292.	284.	237.	25572.
INCHES		0.46	1.80	4.52	6.76
MM		11.79	45.73	114.71	171.40
AC-FT		5120.	19887.	49834.	74633.
THOUS CU M		6315.	24530.	61470.	92058.

STATION 1, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1301.
1334.	1401.	1460.	1511.	1533.	1575.	1623.	1673.	1736.	1806.
1891.	1973.	2051.	2123.	2170.	2267.	2375.	2487.	2600.	2726.
2854.	3093.	3525.	4109.	5468.	6456.	7546.	8481.	9317.	10283.
11434.	12743.	14155.	15538.	16979.	18313.	19555.	20692.	21702.	22576.
23317.	23931.	24478.	24819.	25111.	25330.	25493.	25601.	25707.	25774.
25741.	25563.	25501.	25336.	25154.	24758.	24745.	24515.	24269.	24007.
23733.	23440.	23130.	22824.	22502.	22173.	21839.	21502.	21162.	20822.
20491.	20141.	19802.	19465.	19130.	18799.	18472.	18148.	17827.	17510.
17194.	16882.	16574.	16271.	15976.	15686.	15403.	15127.	14856.	14591.
14333.	14080.	13833.	13591.	13355.	13124.	12899.	12678.	12463.	12252.
12046.	11845.	11648.	11455.	11267.	11082.	10902.	10726.	10553.	10385.
10223.	10059.	9902.	9748.	9597.	9450.	9306.	9165.	9027.	8892.
8759.	8626.	8497.	8370.	8246.	8125.	8006.	7891.	7777.	7667.
7558.	7453.	7349.	7248.	7150.	7053.	6959.	6867.	6778.	6693.
6613.	6535.	6458.	6385.	6313.	6245.	6181.	6127.	6074.	6021.

STORAGE

17525.	17540.	17454.	17368.	17292.	17213.	17165.	17287.	17651.	18199.
19366.	20739.	21671.	22335.	22876.	23509.	24278.	25147.	26080.	27070.
28077.	29050.	29967.	30820.	31604.	32514.	33614.	34734.	35845.	36965.
38112.	40243.	43860.	49617.	56865.	66249.	73103.	78385.	82672.	87845.
93546.	99783.	106275.	112655.	118681.	124304.	129460.	134082.	138128.	141589.
143491.	146077.	148796.	150294.	151414.	152249.	152868.	153278.	153682.	153935.
153810.	153438.	152899.	152270.	151579.	150828.	150012.	149131.	148183.	147171.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	114350.	113087.	[illegible]	110622.	109420.	108238.
[illegible]	[illegible]	[illegible]	[illegible]	107624.	101557.	100509.	99479.	98465.	97469.
[illegible]	95527.	94577.	93647.	92730.	91827.	90939.	90065.	89206.	88360.
87527.	86711.	85736.	85114.	84335.	83508.	82813.	82069.	81330.	80617.
79393.	79172.	78472.	77775.	77088.	76412.	75745.	75088.	74441.	73803.
73174.	72553.	71942.	71338.	70743.	70157.	69577.	69006.	68442.	67886.
67330.	66793.	66256.	65725.	65230.	64681.	64168.	63657.	63155.	62655.

STAGE

710.7	710.7	710.7	710.7	710.7	710.6	710.6	710.7	710.7	710.8
710.9	711.1	711.3	711.4	711.4	711.5	711.6	711.8	711.9	712.0
712.2	712.3	712.5	712.6	712.7	712.8	713.0	713.1	713.3	713.4
713.6	713.9	714.4	715.0	716.1	717.3	718.1	718.8	719.3	719.9
720.7	721.7	722.2	723.0	723.8	724.5	725.1	725.7	726.2	726.6
727.0	727.3	727.5	727.7	727.9	728.0	728.0	728.1	728.2	728.2
728.2	728.1	728.1	728.0	727.9	727.8	727.7	727.6	727.5	727.3
727.2	727.1	726.9	726.8	726.6	726.4	726.3	726.1	725.9	725.8
725.6	725.5	725.3	725.1	724.9	724.7	724.6	724.4	724.2	724.1
723.9	723.7	723.6	723.4	723.2	723.1	722.9	722.8	722.6	722.5
722.3	722.4	722.1	721.9	721.8	721.7	721.5	721.4	721.3	721.1
721.0	720.9	720.8	720.7	720.6	720.4	720.3	720.2	720.1	720.0
719.9	719.8	719.7	719.6	719.5	719.4	719.3	719.2	719.1	719.0
719.0	718.9	718.8	718.7	718.6	718.5	718.4	718.4	718.3	718.2
718.1	718.0	718.0	717.9	717.8	717.7	717.7	717.6	717.5	717.5
717.4	717.3	717.3	717.2	717.1	717.1	717.0	716.9	716.9	716.8

PEAK OUTFLOW IS 25774. AT TIME 60.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	25774.	25660.	24683.	19461.	1909193.
CMS	730.	727.	699.	551.	54062.
INCHES		1.15	4.44	10.49	14.30
MM		29.29	112.70	266.56	363.21
AC-FT		12724.	48958.	115801.	157784.
THOUS CU M		15695.	60389.	142835.	194624.

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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1 1.00	RATIO 2 2.00
				RATIOS APPLIED TO FLOWS	
HYDROGRAPH AT	1	207.00	1	72584.	141368.
	(	5.00)	(	2001.55)(	4003.10)(
ROUTED TO	1	207.00	1	13354.	25774.
	(	5.00)	(	293.19)(	729.84)(

½PMF PMF

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	710.72	710.72	717.00
STORAGE	17712.	17712.	64233.
OUTFLOW	1287.	1287.	6180.

	RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
½ PMF	1.00	719.99	2.99	88204.	10354.	66.00	62.00	0.
PMF	2.00	725.18	11.18	153935.	25774.	121.00	60.00	0.

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FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
  MODIFIED FOR HONEYWELL APR 79
************************************

************************************
THIS PROGRAM IS CURRENTLY BEING MODIFIED
TO RUN ON THE GCOS HONEYWELL SYSTEM

PLEASE REPORT ANY UNUSUAL OPERATING PROBLEMS
TO DICK TILLSON (EXT. 423) FTS 2-5656
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1	A	OWASCO LAKE OUTLET DAM NY-770						OSWEGO RIVER BASIN			
2	A				CITY OF AUBURN			CAYUGA COUNTY			
3	A							PMF - CORPS SPF UH			
4	B	168	1	0	0	0	0	0	0	0	0
5	B1	5									
6	J	1	6	1							
7	J1	0.6	0.62	0.66	0.64	1	2				
8	K	0	1					1			
9	K1			INFLOW HYDROGRAPH							
10	M	-1		207		207	0.80			1	
11	M	121	121	121	121	121	335	398	2340	3364	4556
12	M	10385	7097	5617	3897	4166	5055	5851	6309	6701	7050
13	M	6924	6723	6393	6013	5629	7424	8013	7959	8022	8187
14	M	8496	20259	27138	33914	70684	48823	41105	30826	52370	37598
15	M	42443	45310	46692	45377	43820	41468	39451	36602	33545	30479
16	M	27582	24916	22481	20265	18254	17069	15827	14035	15861	12942
17	M	11297	[illegible]	9144	8662	8219	7750	7237	6723	6199	5693
18	M	5204	4729	4274	3867	3485	3144	2839	2564	2340	2117
19	M	1893	1767	1541	1392	1256	1134	1025	899	780	663
20	M	477	396	329	305	283	264	246	231	216	207
21	M	198	190	183	177	171	166	162	154	154	151
22	M	148	143	139	135	125	123	121	121	121	121
23	M	121	121	121	121	121	121	121	121	121	121
24	M	0									
25	M	0									
26	[illegible]	[illegible]									

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS					
				RATIO 1 0.60	RATIO 2 0.62	RATIO 3 0.66	RATIO 4 0.68	RATIO 5 1.00	RATIO 6 2.00
HYDROGRAPH AT	1	207.00	1	42410.	43824.	46651.	48065.	70684.	141368.
		(66794.10)		(1200.73)(	1240.96)(	1321.02)(	1361.05)(	2001.55)(	4003.10)(
ROUTED TO	1	207.00	1	5657.	5811.	6130.	6321.	10354.	25774.
		(66794.10)		(160.47)(	164.54)(	173.76)(	178.99)(	293.19)(	729.84)(
								½PMF	PMF

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	STORAGE	710.72	710.72	717.00
	OUTFLOW	17714.	17712.	49233.
		1287.	1287.	6188.

	RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
	0.60	716.36	1.	57157.	5667.	0.	63.00	0.
	0.62	716.56	1.	60673.	5811.	0.	63.00	0.
	0.66	716.94	1.	63744.	6136.	0.	63.00	0.
½ PMF.	0.68	717.13	0.13	65257.	6321.	14.00	63.00	0.
	1.00	719.99	2.99	84204.	10354.	66.00	62.00	0.
PMF	2.00	723.18	11.18	153935.	25774.	121.00	60.00	0.

04235396 OWASCO LAKE NEAR AUBURN, NY

LOCATION.--Lat 42°53'56", long 76°33'17", Cayuga County, Hydrologic Unit 04140201, on west side of breakwater at city of Auburn water intake and pumping station, 1 mi (2 km) south of city limits of Auburn, and 1.8 mi (2.9 km) upstream from State dam.

DRAINAGE AREA.--205 mi² (531 km²)

PERIOD OF RECORD.--October 1967 to current year. Records since 1912 collected by, and in files of, city of Auburn.

GAGE.--Nonrecording gage read once daily by employees of city of Auburn Water Division. Datum of gage (revised) is at mean sea level. Reference mark at elevation 715.48 ft (218.078 m) above mean sea level.

REMARKS.--Lake elevation regulated by gates on outlet at State dam. Area of water surface, 10.6 mi² (27.5 km²).

COOPERATION.--Records furnished by city of Auburn.

EXTREMES FOR PERIOD OF RECORD.--Maximum observed elevation, 718.88 ft (218.985 m) June 23, 1972; minimum observed, 709.31 ft (216.171 m) Mar. 10-14, 1969.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum observed elevation since 1912, 718.91 ft (218.114 m) Mar. 23, 1936, Apr. 9, 1940.

EXTREMES FOR CURRENT YEAR.--Maximum observed elevation, 713.93 ft (217.606 m) Oct. 1, minimum observed, 710.30 ft (216.499 m) Jan. 12, 13.

ELEVATION, IN FEET ABOVE MEAN SEA LEVEL, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976
INSTANTANEOUS OBSERVATIONS AT 0700

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	713.93	711.43	711.04	711.18	710.99	712.76	711.83	712.47	713.01	712.72	712.66	712.78
2	713.63	711.28	711.04	711.08	710.97	712.81	711.24	712.48	713.03	712.70	712.71	712.69
3	713.38	711.22	711.01	711.04	710.88	713.11	711.36	712.45	712.98	712.71	712.73	712.71
4	713.17	711.18	711.02	710.92	710.82	713.59	711.42	712.35	712.95	712.62	712.73	712.73
5	712.88	711.16	711.05	710.88	710.73	713.76	711.44	712.33	712.89	712.55	712.70	712.71
6	712.66	711.13	711.01	710.72	710.66	713.73	711.38	712.24	712.83	712.48	712.67	712.78
7	712.58	711.18	711.71	710.61	710.59	713.53	711.38	712.32	712.82	712.58	712.63	712.68
8	712.33	711.07	711.74	710.49	710.58	713.29	711.41	712.45	712.81	712.58	712.78	712.66
9	712.15	711.03	711.73	710.42	710.41	712.98	711.45	712.53	712.86	712.68	712.88	712.68
10	712.01	711.03	711.92	710.38	710.26	712.81	711.49	712.59	712.98	712.64	712.81	712.71
11	711.86	711.02	712.14	710.36	710.37	712.53	711.52	712.66	712.93	712.69	712.59	712.72
12	711.71	711.06	712.18	710.38	710.37	712.38	711.55	712.63	712.86	712.71	712.65	712.69
13	711.60	711.12	712.03	710.38	710.48	712.16	711.56	712.61	712.68	712.86	712.63	712.63
14	711.66	711.28	712.02	710.33	710.46	711.98	711.61	712.74	712.88	712.97	712.72	712.61
15	711.73	711.27	711.93	710.33	710.56	711.78	711.66	713.15	712.86	712.99	712.79	712.63
16	711.78	711.38	711.92	710.35	710.62	711.63	711.63	712.57	712.82	712.78	712.79	712.61
17	711.74	711.33	711.92	710.33	711.06	711.51	712.43	712.58	712.65	712.55	712.71	712.66
18	711.62	711.34	711.83	710.33	711.65	711.38	712.34	712.52	712.62	712.62	712.71	712.68
19	711.55	711.34	711.72	710.32	712.44	711.[illegible]	712.24	[illegible]2.44	712.80	712.64	712.71	712.68
20	711.55	711.37	711.68	710.32	712.83	711.28	712.29	713.43	712.76	712.78	712.73	712.63
21	711.52	711.44	711.64	710.33	712.84	711.18	712.13	713.29	713.04	712.76	712.73	712.56
22	711.76	711.51	711.58	710.34	712.91	711.38	712.80	713.0[illegible]	712.82	712.78	712.73	712.48
23	711.71	711.54	711.46	710.36	713.28	711.38	711.88	712.90	712.76	712.83	712.72	712.43
24	711.68	711.57	711.41	710.38	713.12	711.36	711.76	712.66	713.29	712.73	712.71	712.31
25	711.65	711.56	711.39	710.39	712.98	711.26	711.76	712.64	712.61	712.64	712.71	712.27
26	711.60	711.58	711.33	710.41	712.86	711.16	712.11	712.65	713.29	712.72	712.70	712.20
27	711.93	711.59	711.33	710.38	712.84	711.18	712.35	712.65	712.55	712.71	712.78	712.16
28	711.83	711.57	711.33	710.37	712.84	711.28	712.47	712.73	712.51	712.72	712.73	712.18
29	711.69	711.58	711.38	711.35	712.78	711.45	712.58	712.82	712.54	712.73	712.75	712.15
30	711.58	711.64	711.31	711.25	---	710.49	712.57	712.85	712.55	712.74	712.72	712.18
31	711.44	---	711.28	711.03	---	710.95	---	712.94	---	712.62	712.72	---
MEAN	712.12	711.32	711.65	710.58	711.93	712.04	711.81	712.67	712.85	712.69	712.71	712.58
MAX	713.93	711.64	712.[illegible]	711.18	713.28	713.78	712.54	713.29	713.29	712.97	712.88	713.18
MIN	711.44	711.02	711.28	710.32	710.26	710.95	711.83	712.24	712.51	712.48	712.51	712.18

WTR YR 1976 MEAN 712.65 MAX 713.93 MIN 710.32
CAL YR 1975 MEAN 711.95 MAX 7[illegible] MIN 710.44

04235500 OWASCO OUTLET NEAR AUBURN, NY

LOCATION.--Lat 42°55'48", long 76°35'58", Cayuga County, Hydrologic Unit 04140201, on left bank 2.5 mi (4.0 km) downstream from center of Auburn, and 4 mi (6 km) downstream from State dam at outlet of Owasco Lake.

DRAINAGE AREA.--204 mi² (534 km²).

PERIOD OF RECORD.--November 1911 to current year. Prior to October 1966, published as "Owasco Lake Outlet."

REVISED RECORDS.--WSP 924 1913-14, 1916, 1918(M), 1922(M), 1925(M), 1928, 1933(M) WRD NY 1967 Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 533.92 ft (162.759 m) above mean sea level.

REMARKS.--Records fair. Diurnal fluctuation caused by mills in Auburn. Seasonal regulation at State dam. Diversion from Owasco Lake (see station 04235550) by city of Auburn for municipal water supply; sewage returns to outlet upstream from station.

AVERAGE DISCHARGE.--63 years (1913-76), 267 ft³/s (3.126 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,250 ft³/s (92.0 m³/s) June 23, 1972, gage height, 6.28 ft (1.914 m), minimum, about 2 ft³/s (0.057 m³/s) Dec. 5, 1936, minimum gage height, 1.19 ft (0.363 m) June 26, 1973, minimum daily discharge, 1 ft³/s (0.14 m³/s) Nov. 11, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,720 ft³/s (48.7 m³/s) Mar. 4, gage height, 4.10 ft (1.250 m); minimum, 14 ft³/s (0.40 m³/s) Oct. 24, gage height, 1.32 ft (0.402 m)

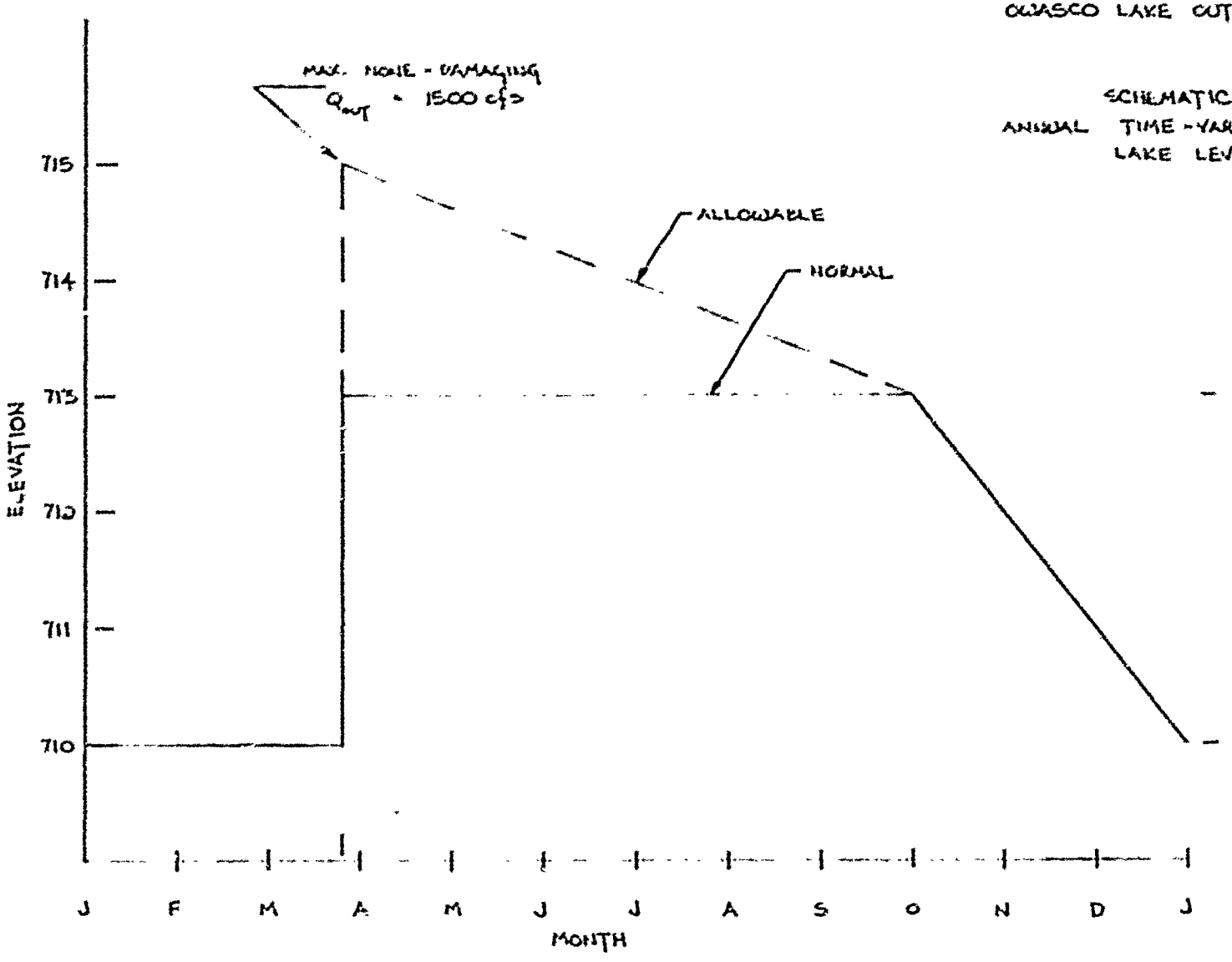
DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1410	446	215	629	653	1250	263	866	320	74	69	45
2	1240	484	207	621	642	1200	148	843	527	277	64	48
3	1130	377	277	594	639	1440	162	844	416	448	147	39
4	1350	371	277	588	631	1540	177	764	355	435	193	34
5	969	314	277	588	627	1650	191	655	344	417	190	35
6	845	297	292	588	621	1460	454	338	342	228	184	34
7	783	287	353	588	615	1520	437	54	343	68	174	34
8	749	267	328	572	611	1450	57	48	236	71	294	36
9	759	257	328	519	607	1240	57	47	44	68	394	37
10	725	262	398	565	565	1240	54	47	50	66	484	101
11	637	244	432	565	323	1240	55	54	144	70	21	190
12	565	267	526	432	116	1180	54	216	206	449	63	195
13	238	277	649	351	123	1010	53	641	257	1030	79	111
14	23	282	654	238	121	950	53	539	200	1190	144	25
15	21	292	637	179	124	690	93	611	266	1130	210	35
16	173	292	621	144	151	547	728	565	154	1070	364	38
17	314	292	626	158	293	828	691	291	342	584	269	42
18	383	292	565	158	931	692	617	481	335	158	66	25
19	297	188	534	149	1150	598	482	411	327	129	66	84
20	654	644	584	54	1210	565	483	984	251	64	65	278
21	759	234	482	58	1230	587	759	1210	158	123	64	282
22	697	244	452	67	1280	588	759	1260	1250	71	63	250
23	383	257	432	66	1340	581	785	1180	796	236	65	240
24	28	184	417	64	1260	575	672	912	434	331	64	221
25	42	262	411	64	1250	524	716	588	328	184	62	218
26	29	262	464	158	1310	582	811	421	287	62	61	213
27	252	262	464	328	1280	649	857	231	388	61	54	208
28	594	252	411	413	1275	468	892	57	179	61	64	198
29	544	267	439	365	1178	465	924	55	72	195	45	193
30	584	282	439	645	---	457	919	54	61	574	42	185
31	475	---	557	648	---	399	---	55	---	299	41	---
TOTAL	17349	9358	13542	11274	22288	28896	12796	15497	10274	10222	4214	3672
MEAN	560	274	437	364	768	931	457	500	342	330	136	122
MAX	1410	446	648	665	1340	1650	924	1310	1150	1190	594	278
MIN	23	144	215	46	116	399	53	47	44	61	21	34

CAL YR 1975 TOTAL 127965 MEAN 351 MAX 1790 MIN 18
WTR YR 1976 TOTAL 150253 MEAN 411 MAX 1650 MIN 20

OWASCO LAKE OUTLET & DAM
NY-776

SCHEMATIC
ANNUAL TIME-VARIATION OF
LAKE LEVELS



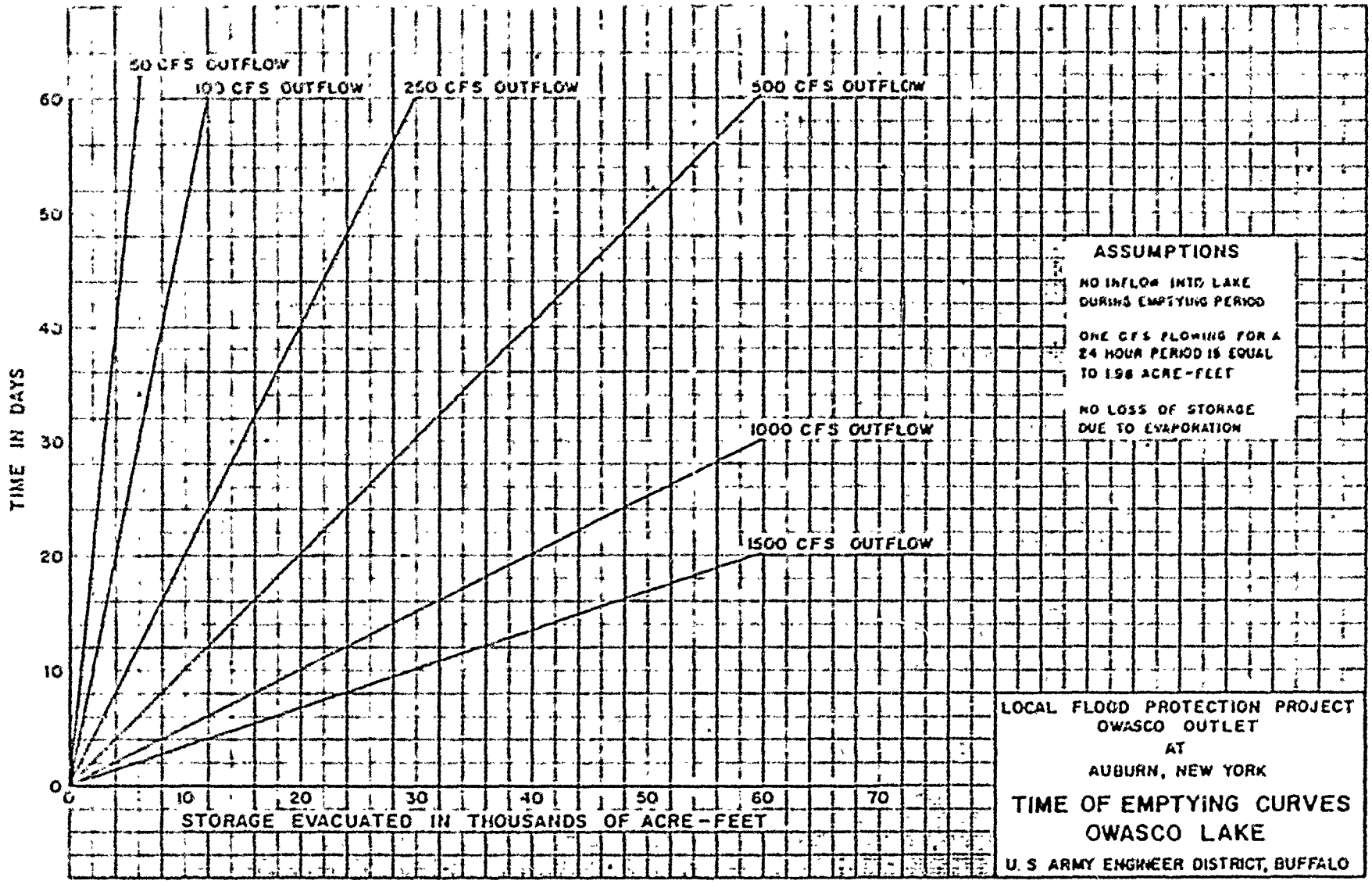
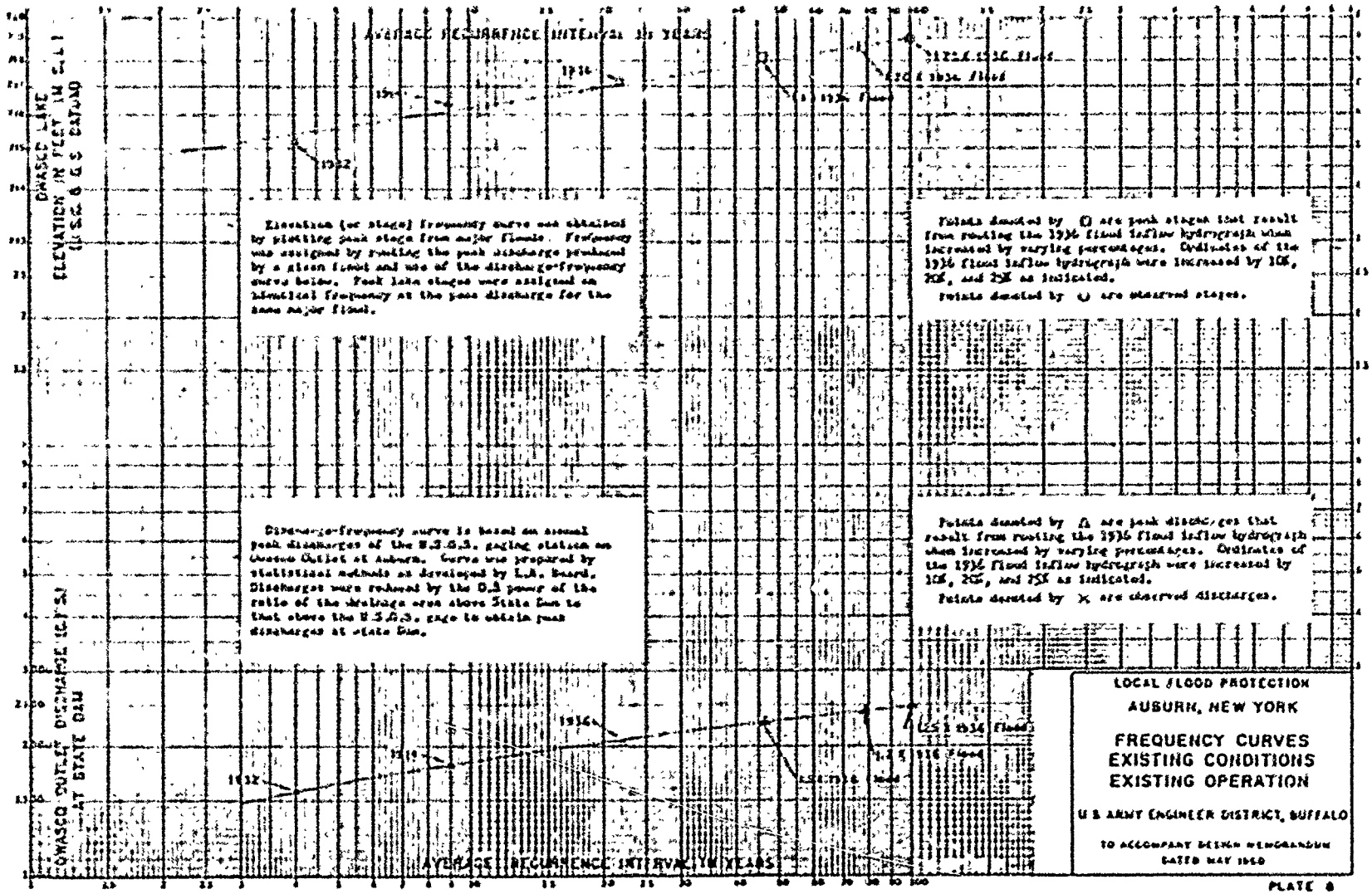
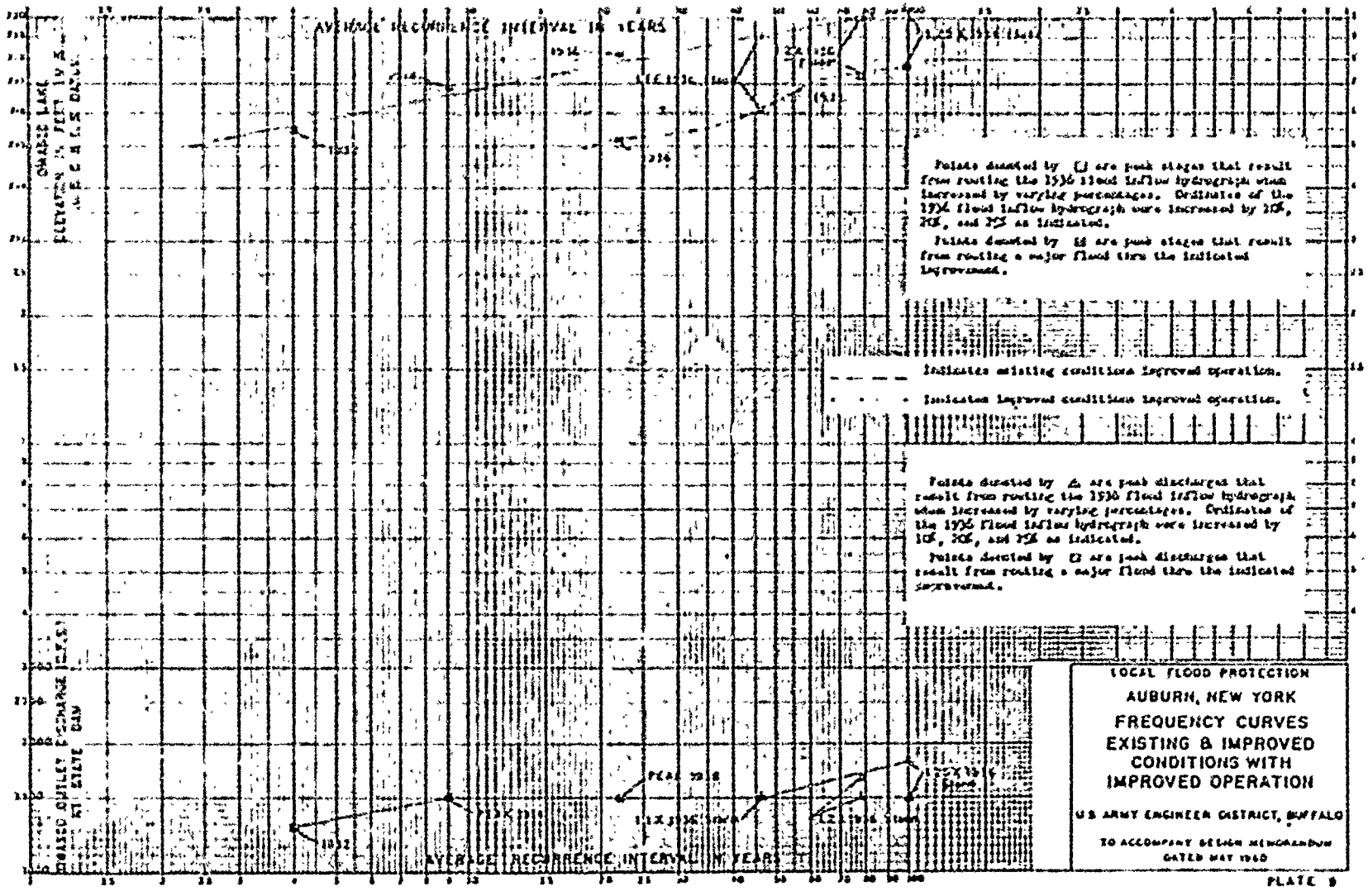


PLATE A3

DAM: NY-776


AVERAGE RECURRENCE INTERVAL IN YEARS
OWASCO LAKE ELEVATION IN FEET (M.S.L. U.S.C. & G.S. DATUM)
OWASCO OUTLET DISCHARGE IN C.F.S. AT STATE DAM
Elevation (or stage) frequency curve was obtained by plotting peak stage from major floods. Frequency was assigned by routing the peak discharge produced by a given flood and use of the discharge-frequency curve below. Peak lake stages were assigned an identical frequency at the peak discharge for the same major flood.
Discharge-frequency curve is based on annual peak discharges of the U.S.G.S. gaging station on Owasco Outlet at Auburn. Curve was prepared by statistical methods as developed by L.R. Beard. Discharges were reduced by the 0.8 power of the ratio of the drainage area above State Dam to that above the U.S.G.S. gage to obtain peak discharges at state Dam.
Points denoted by ○ are peak stages that result from routing the 1936 flood inflow hydrograph when increased by varying percentages. Ordinates of the 1936 flood inflow hydrograph were increased by 10%, 25%, and 25% as indicated.
Points denoted by ○ are observed stages.
Points denoted by △ are peak discharges that result from routing the 1936 flood inflow hydrograph when increased by varying percentages. Ordinates of the 1936 flood inflow hydrograph were increased by 10%, 25%, and 25% as indicated.
Points denoted by × are observed discharges.
1936
1934
1932
LOCAL FLOOD PROTECTION
AUBURN, NEW YORK
FREQUENCY CURVES
EXISTING CONDITIONS
EXISTING OPERATION
U S ARMY ENGINEER DISTRICT, BUFFALO
TO ACCOMPANY DESIGN MEMORANDUM
DATED MAY 1960
PLATE 8

DAM: NY-776


AVERAGE RECURRENCE INTERVAL IN YEARS
CHASSE LAKE
ELEVATION IN FEET (N.G.V.D.)
CROSSED OUTLET DISCHARGE (C.F.S.)
AT STATE DAM
AVERAGE RECURRENCE INTERVAL IN YEARS
Points denoted by ☐ are peak stages that result from routing the 1936 flood inflow hydrographs when increased by varying percentages. Ordinates of the 1936 flood inflow hydrographs were increased by 10%, 20%, and 25% as indicated.
Points denoted by ☐ are peak stages that result from routing a major flood thru the indicated improvement.
Indicates existing conditions improved operation.
Indicates improved conditions improved operation.
Points denoted by △ are peak discharges that result from routing the 1936 flood inflow hydrographs when increased by varying percentages. Ordinates of the 1936 flood inflow hydrographs were increased by 10%, 20%, and 25% as indicated.
Points denoted by △ are peak discharges that result from routing a major flood thru the indicated improvement.
LOCAL FLOOD PROTECTION
AUBURN, NEW YORK
FREQUENCY CURVES
EXISTING & IMPROVED
CONDITIONS WITH
IMPROVED OPERATION
U.S. ARMY ENGINEER DISTRICT, BUFFALO
TO ACCOMPANY DESIGN MEMORANDUM
DATED MAY 1960
PLATE 9

DAM: NY-776

TABLE A1 Average monthly precipitation in inches

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Auburn Water Works	(1)	2.21	2.24	3.09	2.67	2.96	2.78	3.16	2.40	2.52	2.88	2.72	2.50	32.13
Locke & W	(2)	2.21	2.19	2.92	2.93	3.44	3.60	3.99	3.45	3.25	3.13	2.82	2.62	36.55
Cortland	(1)	2.70	2.63	3.54	3.09	3.71	3.64	4.15	3.85	3.21	3.33	3.01	3.16	40.02
Average		2.37	2.35	3.18	2.90	3.37	3.34	3.77	3.23	2.99	3.11	2.85	2.76	36.22

(1) Long-term Weather Bureau Mean
(2) 29-year average

TABLE A2 Mean monthly snowfall in inches

Station		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Auburn Water Works	(1)	18.4	17.8	14.3	3.2	.1	T		T	T	.4	6.8	15.1	
Cortland	(2)	15.0	15.1	12.5	3.9	.3	T			T	.3	5.4	11.9	64.4
Average		16.7	16.4	13.4	3.6	.2	T		T	T	.4	6.1	13.5	70.3

(1) 62-year average
(2) 60-year average

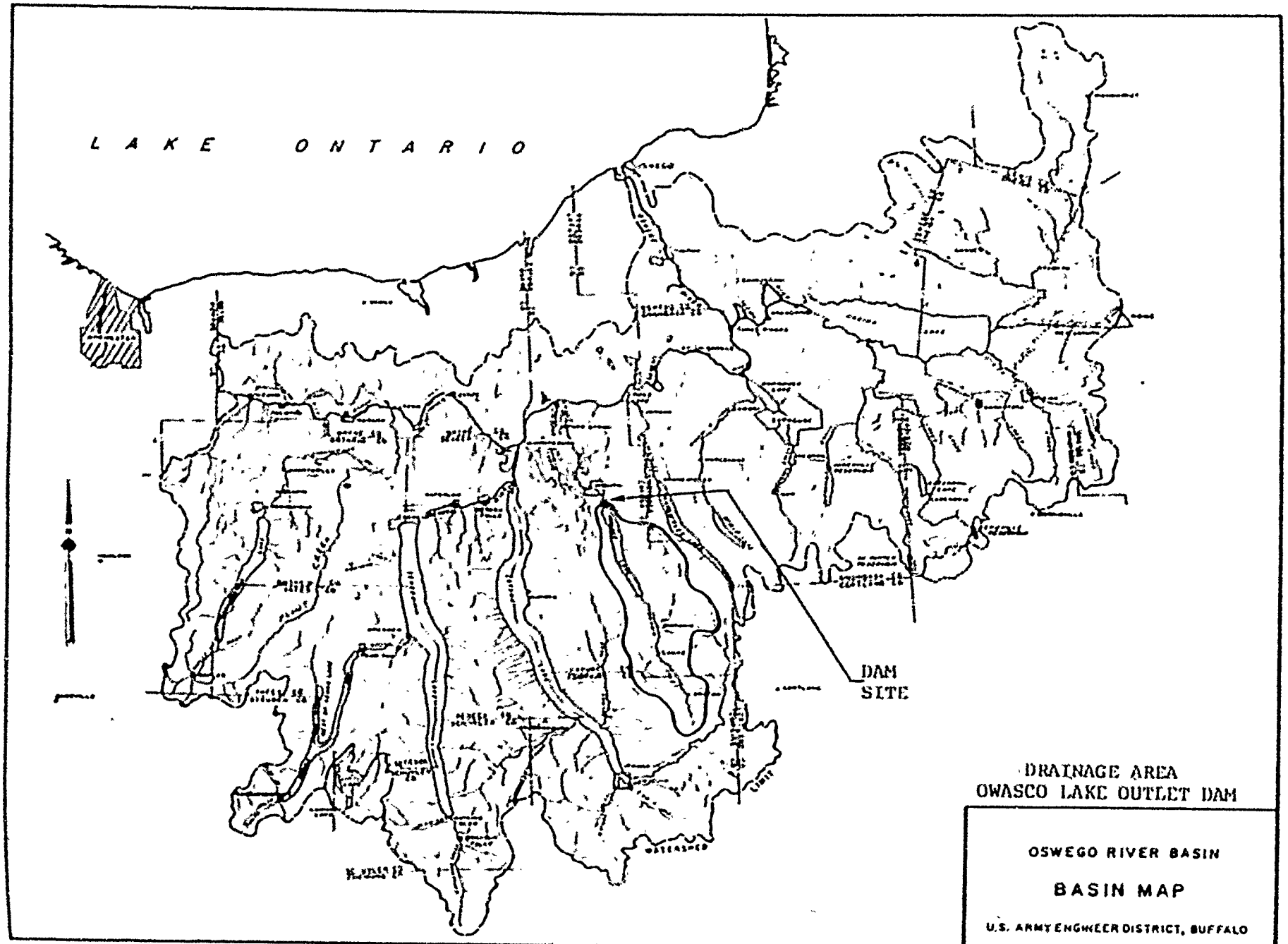
T = Trace

OWASCO LAKE OUTLET DAM
"STATE DAM" NY-776

TABLE A3 Average monthly evaporation in inches and acre-feet

Station	May	June	July	Aug.	Sept.	Oct.
Ithaca Cornell U. (1)	4.29	5.16	5.87	4.94	3.35	2.14
Aurora Research Farm	4.75	6.16	6.42	5.62	4.04	2.65
Average in Inches	4.52	5.66	6.14	5.28	3.70	2.40
Average loss in Acre-feet (2)	2,700	3,300	3,600	3,100	2,200	1,400

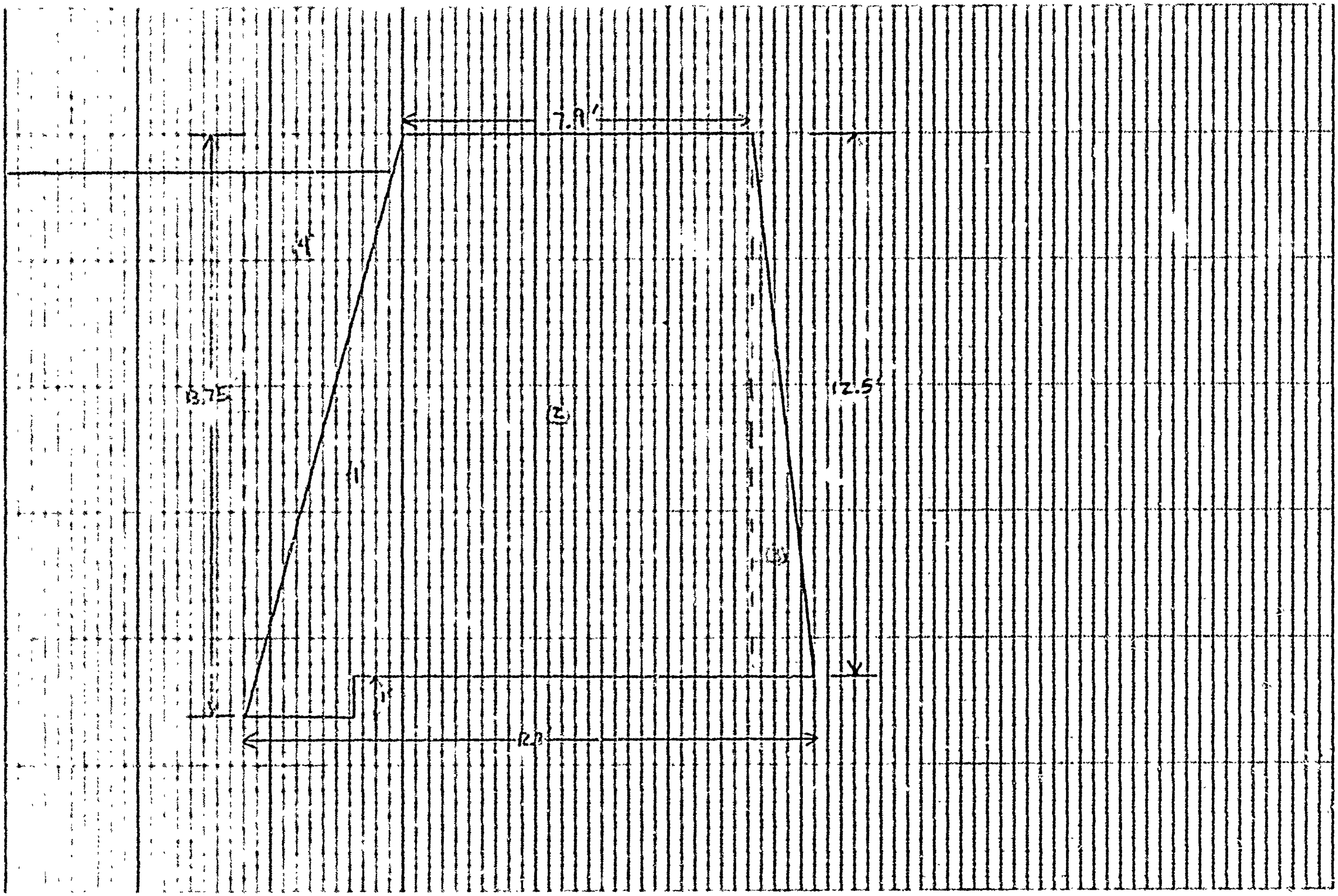
(1) Long-term Weather Bureau Mean
(2) Average loss due to evaporation in lake storage based on a summer lake elevation of 713.0


LAKE ONTARIO
DAM SITE
DRAINAGE AREA
OWASCO LAKE OUTLET DAM
OSWEGO RIVER BASIN
BASIN MAP
U.S. ARMY ENGINEER DISTRICT, BUFFALO

APPENDIX D

STABILITY COMPUTATIONS

46 0700



00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

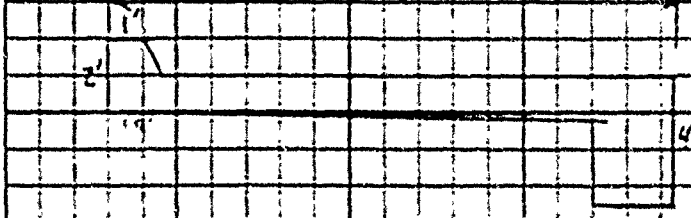
PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
OWASCO LAKE OUTLET DAM	1		
SUBJECT		**COMPUTED BY**	**DATE**
STAB. + EQUILIBRIUM		RLW	9/14/79

COMPUTE AREAS & MOMENT ARMS

AREA NO.	AREA	Distance From Centroid To Toe
(1)	$\frac{1}{2}(3.5)(13.75)+(11)(1)=28.75$	10.9
(2)	$(7.8)(12.5)=98.76$	5.4
(3)	$\frac{1}{2}(.14)(13.5)=1.89$	.94
(4)	$\frac{1}{2}(3.5)(12.75)(.12)\div\frac{.288}{.5}=17.55$	11.61

CALCULATE EFFECT OF AREA 3 INCREASE SLIDING RESISTANCE



AREA $1.5\times1.2=1.80$

$\frac{1}{2}(1.2)(1.8)=1.08$

$(1.2)(14.5)=17.52$

$(4)(30.5)=61.71$

$127.23'(.15\ K/ft)=4.59\ K$

Hor. = Horiz. Force $(4.09)(.55)=2.23\ K$

PASSIVE PRESSURE OF SOIL ON AREA 4

$P_p=\frac{1}{2}(.065)(3.5)(4.25)^2=1.63\ K$

TOTAL HORIZONTAL FORCE $=2.23-1.93=3.86\ K$

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
QUASCO LAKE CUTLET DAM	2		
SUBJECT		**COMPUTED BY**	**DATE**
STABILITY ANALYSIS		RLW	9/14/79

REVISED SLIDING SAFETY FACTORS

NORMAL CONDITIONS

$$F.S._{SLIDING} = \frac{\text{RESISTING FORCE} + \text{HORIZ. APPROX FORCE}}{\text{SLIDING FORCE}} = \frac{11{,}24 + 3{,}86}{6.68}$$

$$F.S. = 2.26$$

ICE LOADING

$$F.S._{SLIDING} = \frac{11{,}24 + 3{,}80}{14{,}18} = 1.07$$

½ PMF

$$F.S._{SLIDING} = \frac{11{,}24 + 3{,}80}{10.77} = 1.38$$

PMF

$$F.S._{SLIDING} = \frac{11{,}24 + 3{,}80}{17.33} = .84$$

00-15-1 (3/78)
Formerly GA-17

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
Duane Lake Outlet Dam	3		
SUBJECT: Seismic Stability Analysis		COMPUTED BY: RW	DATE: 9/4/79

Normal Conditions - Water At Crest + No Ice

1. Calculate Horizontal Force on Upstream Face

$P_e = c \lambda w h = (.7)(.1)(.0624)(12.75) = .056$

2. Calculate Moment & Force of Earthquake

$M_e = .299 P_e y^2 = .299(.056)(12.75)^2 = 2.71$

$V_e = .726 (P_e) y = (.726)(.056)(12.75) = .52$

3. Reduce Weight of Concrete by 5%

$(.95)(.85) = .1426 \text{ k/sq ft}$

4. Revised Overturning Safety Factor Seismic Analysis

$F.S. = \frac{\text{Resisting Moment}}{\text{Overturning Mom} + \text{Earthquake Mom}} = \frac{102.96}{58.8 + 2.71} = 1.67$

5. Revised Sliding Safety Factor Seismic Analysis

$F.S. = \frac{\text{Resisting Force}}{\text{Sliding Force} + \text{Earthquake Force}} = \frac{0.48}{6.64 + .52} = 1.45$

INPUT TO STABILITY ANALYSIS PROGRAM

INPUT ENTRY	PROGRAM No.
Unit Weight of Dam (K/ft^3)	0
Area of Segment No. 1 (ft^2)	1
Distance from Center of Gravity of Segment No. 1 to Downstream Toe (ft)	2
Area of Segment No. 2 (ft^2)	3
Distance from Center of Gravity of Segment No. 2 to Downstream Toe (ft)	4
Area of Segment No. 3 (ft^2)	5
Distance from Center of Gravity of Segment No. 3 to Downstream Toe (ft)	6
Base Width of Dam (Total) (ft)	7
Height of Dam (ft)	8
Ice Loading (K/L ft.)	9
Coefficient of Sliding	10
Unit Weight of Soil (K/ft^3)	11
Active Soil Coefficient - Ka	12
Passive Soil Coefficient - Kp	13
Height of Water over Top of Dam or Spillway (ft)	14
Height of Soil for Active Pressure (ft)	15
Height of Soil for Passive Pressure (ft)	16
Height of Water in Tailrace Channel (ft)	17
Weight of Water (K/ft^3)	18
Area of Segment No. 4 (ft^2)	19
Distance from Center of Gravity of Segment No. 4 to Downstream Toe (ft)	20
Height of Ice Load or Active Water (ft)	46

Normal Conditions		Ice Load 7.5 ksf	
0.15	RCL 1	0.15	RCL 1
33.8		33.8	
23.8	RCL 2	23.8	RCL 2
10.5		10.5	
10.5	RCL 3	10.5	RCL 3
98.8		98.8	
98.8	RCL 4	98.8	RCL 4
5.4		5.4	
5.4	RCL 5	5.4	RCL 5
8.8		8.8	
8.8	RCL 6	8.8	RCL 6
0.94		0.94	
0.94	RCL 7	0.94	RCL 7
12.9		12.9	
12.9	RCL 8	12.9	RCL 8
13.75		13.75	
13.75	RCL 9	13.75	RCL 9
0.		7.5	
0.	RCL 10	7.5	RCL 10
0.65		0.65	
0.65	RCL 11	0.65	RCL 11
0.06		0.06	
0.06	RCL 12	0.06	RCL 12
0.23		0.23	
0.22	RCL 13	0.23	RCL 13
2.		2.	
3.	RCL 14	3.	RCL 14
0.		0.	
0.	RCL 15	0.	RCL 15
12.75		12.75	
12.75	RCL 16	12.75	RCL 16
3.		3.	
3.	RCL 17	3.	RCL 17
3.		3.	
3.	RCL 18	3.	RCL 18
0.0624		0.0624	
0.0624	RCL 19	0.0624	RCL 19
17.85		17.85	
17.85	RCL 20	17.85	RCL 20
11.61		11.61	
11.61	RCL 46	11.61	RCL 46
12.75		12.75	

1. [illegible] ← F.S. vs Overturning → [illegible]

2. [illegible] -1. [illegible]

½ PMF

0.15	RCL 1
23.8	
23.8	RCL 2
10.5	
10.5	RCL 3
98.8	
98.8	RCL 4
5.4	
5.4	RCL 5
8.8	
8.8	RCL 6
0.94	
0.94	RCL 7
12.9	
12.9	RCL 8
13.75	
13.75	RCL 9
0.	
0.	RCL 10
0.65	
0.65	RCL 11
0.06	
0.06	RCL 12
0.23	
0.23	RCL 13
3.	
3.	RCL 14
5.	
5.	RCL 15
12.75	
12.75	RCL 16
3.	
3.	RCL 17
3.	
3.	RCL 18
0.0624	
0.0624	RCL 19
17.85	
17.85	RCL 20
11.61	
11.61	RCL 46
12.75	

PMF

0.15	RCL 1
23.8	
23.8	RCL 2
10.5	
10.5	RCL 3
98.8	
98.8	RCL 4
5.4	
5.4	RCL 5
8.8	
8.8	RCL 6
0.94	
0.94	RCL 7
12.9	
12.9	RCL 8
13.75	
13.75	RCL 9
0.	
0.	RCL 10
0.65	
0.65	RCL 11
0.06	
0.06	RCL 12
0.23	
0.23	RCL 13
3.	
3.	RCL 14
5.	
5.	RCL 15
12.75	
12.75	RCL 16
3.	
3.	RCL 17
3.	
3.	RCL 18
0.0624	
0.0624	RCL 19
17.85	
17.85	RCL 20
11.61	
11.61	RCL 46
12.75	

F.S. vs. OVERTURNING

0.142	RCL 1
23.8	
23.8	RCL 2
10.5	
10.5	RCL 3
98.8	
98.8	RCL 4
5.4	
5.4	RCL 5
8.8	
8.8	RCL 6
0.94	
0.94	RCL 7
12.9	
12.9	RCL 8
13.75	
13.75	RCL 9
0.	
0.	RCL 10
0.65	
0.65	RCL 11
0.06	
0.06	RCL 12
0.33	
0.33	RCL 13
3.	
3.	RCL 14
0.	
0.	RCL 15
12.75	
12.75	RCL 16
3.	
3.	RCL 17
3.	
3.	RCL 18
0.0624	
0.0624	RCL 19
17.85	
17.85	RCL 20
11.61	
11.61	RCL 46
12.75	

APPENDIX E

REFERENCES

APPENDIX E

REFERENCES

1) U.S. Army, Corps of Engineers:

   a) Design Memorandum on Local Flood Protection - Auburn, New York; Buffalo District, May 1960.

   b) HEC-1 Flood Hydrograph Package - Dam Safety Version, September 1978.

   c) Operation and Maintenance Manual for Local Flood Protection Project on Owasco Outlet at Auburn, New York; Buffalo District, September 1961.

   d) Owasco Lake - Standard Project Flood Hydrograph; Buffalo District; July 14, 1975 letter.

2) U.S. Department of Agriculture, Soil Conservation Service; National Engineering Handbook; Section 4 - Hydrology, August 1972.

3) U.S. Department of the Interior, Bureau of Reclamation:

   a) Design of Small Dams, 2nd Edition (Rev. report), 1977.

   b) Hydraulic and Excavation Table, 11th Edition, (Reprinted) 1974.

4) U.S. Department of the Interior, Geological Survey; Water Resources Data for New York - Water Year 1976 - Vol. 1, USGS Report NY-76-1, 1977.

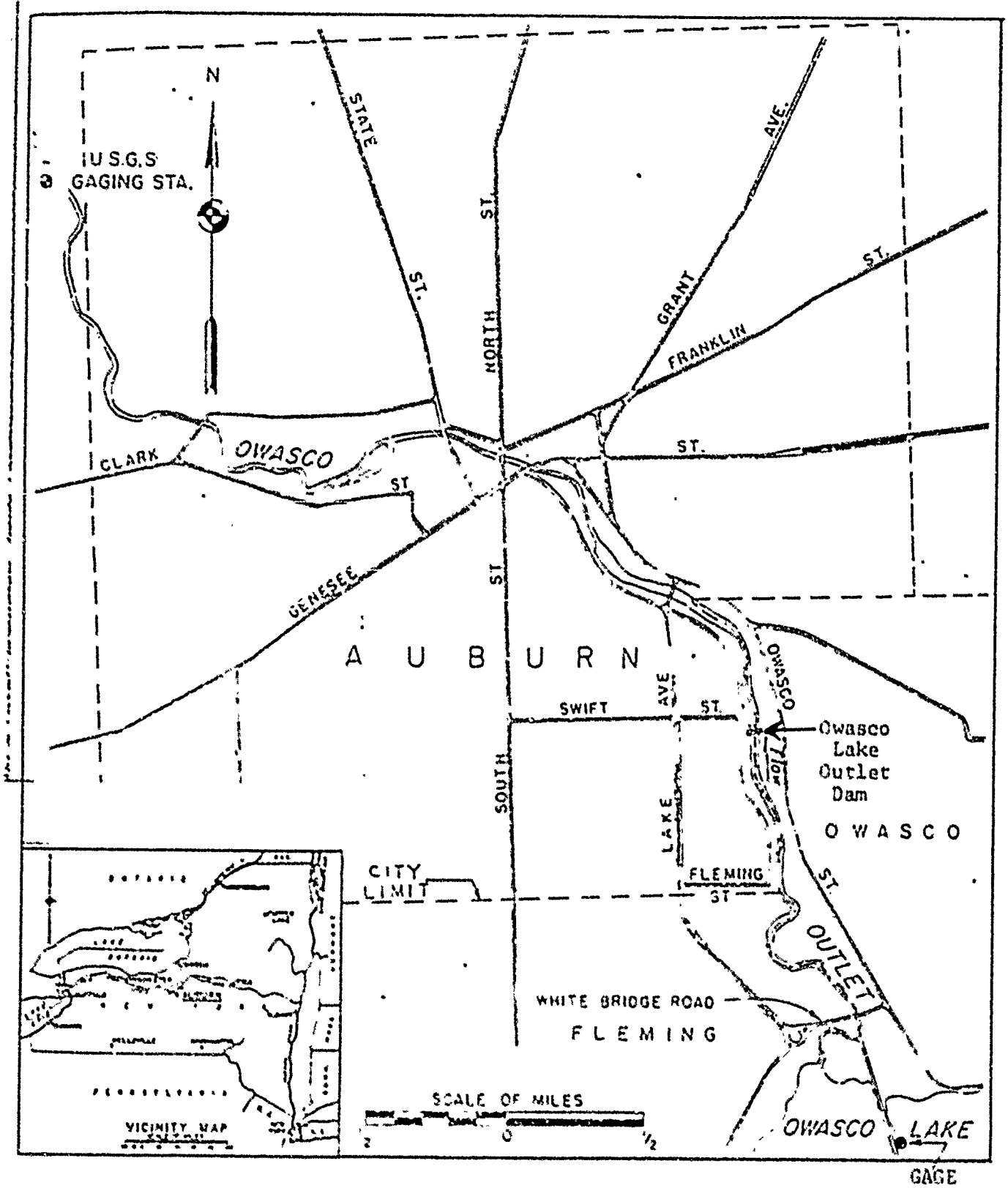
5) H. W. King and E. F. Brater; Handbook of Hydraulics, 5th Edition, McGraw-Hill, 1963.

6) R. K. Linsley, Jr., M. A. Kohler, and J. L. H. Paulhus; Hydrology for Engineers, 2nd Edition, McGraw-Hill, 1975.

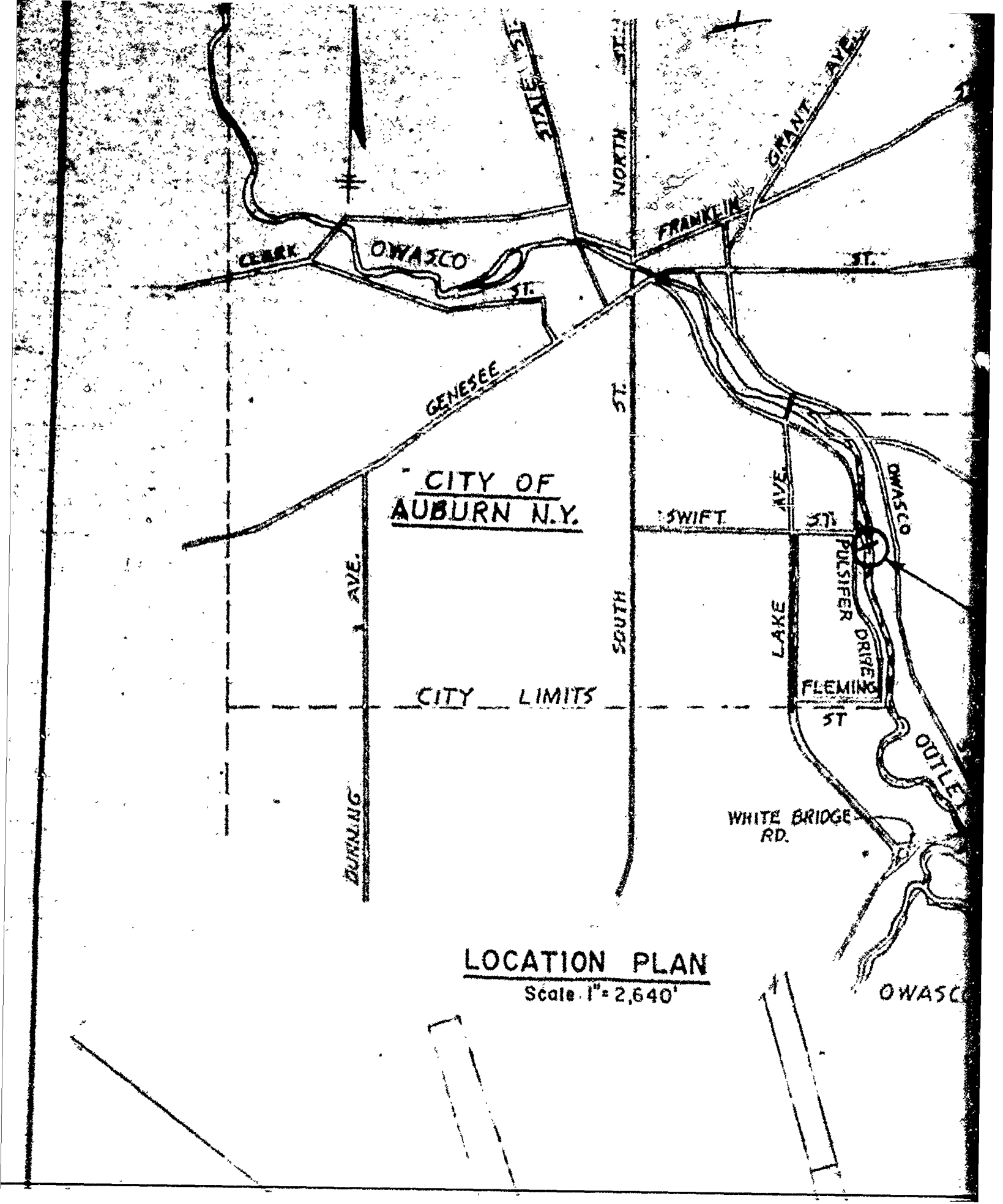
7) University of the State of New York; Geology of New York, Education Leaflet 20, (Reprint) 1973.

APPENDIX F

DRAWINGS



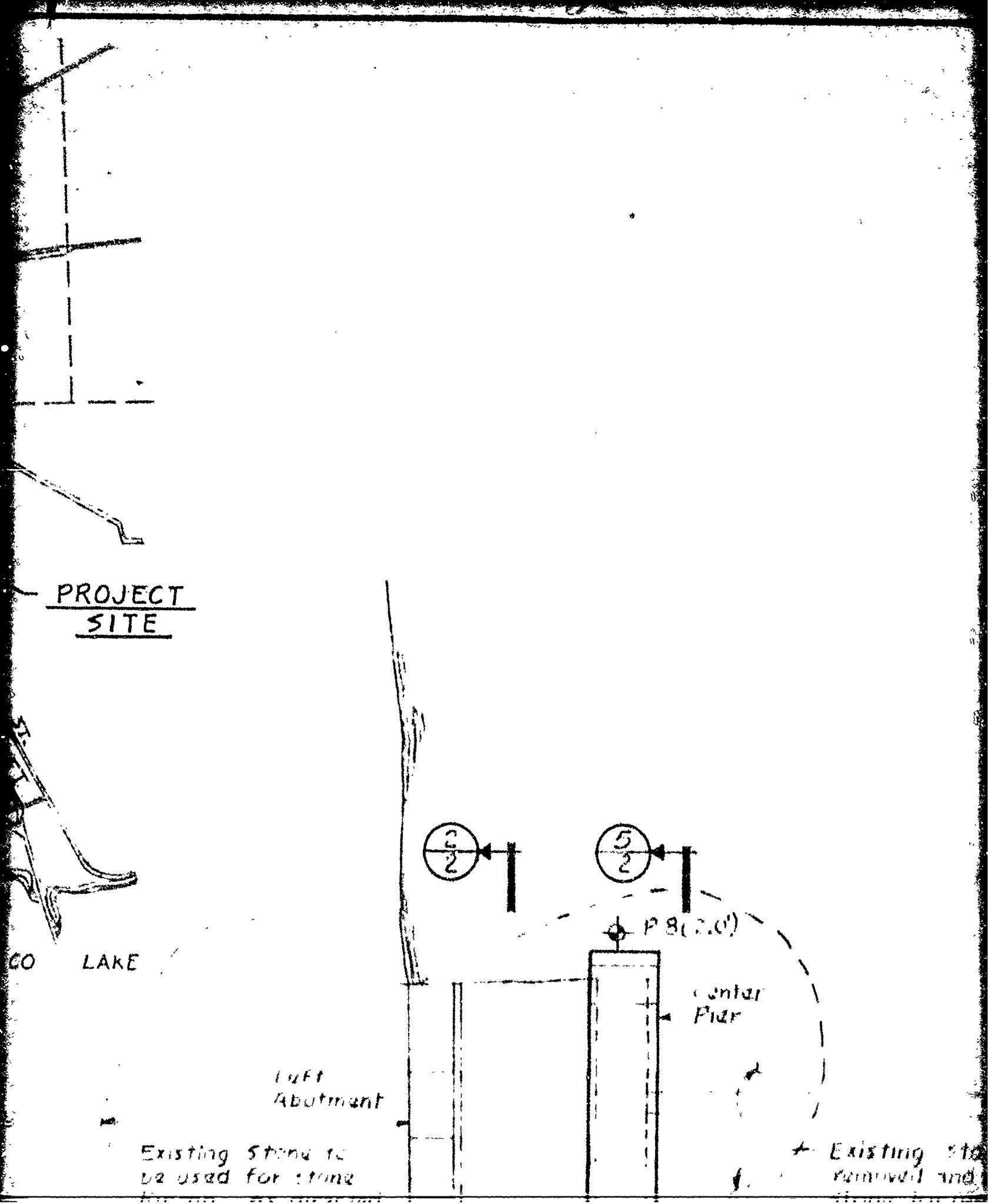
LOCATION MAP
OWASCO LAKE OUTLET DAM
NY-776

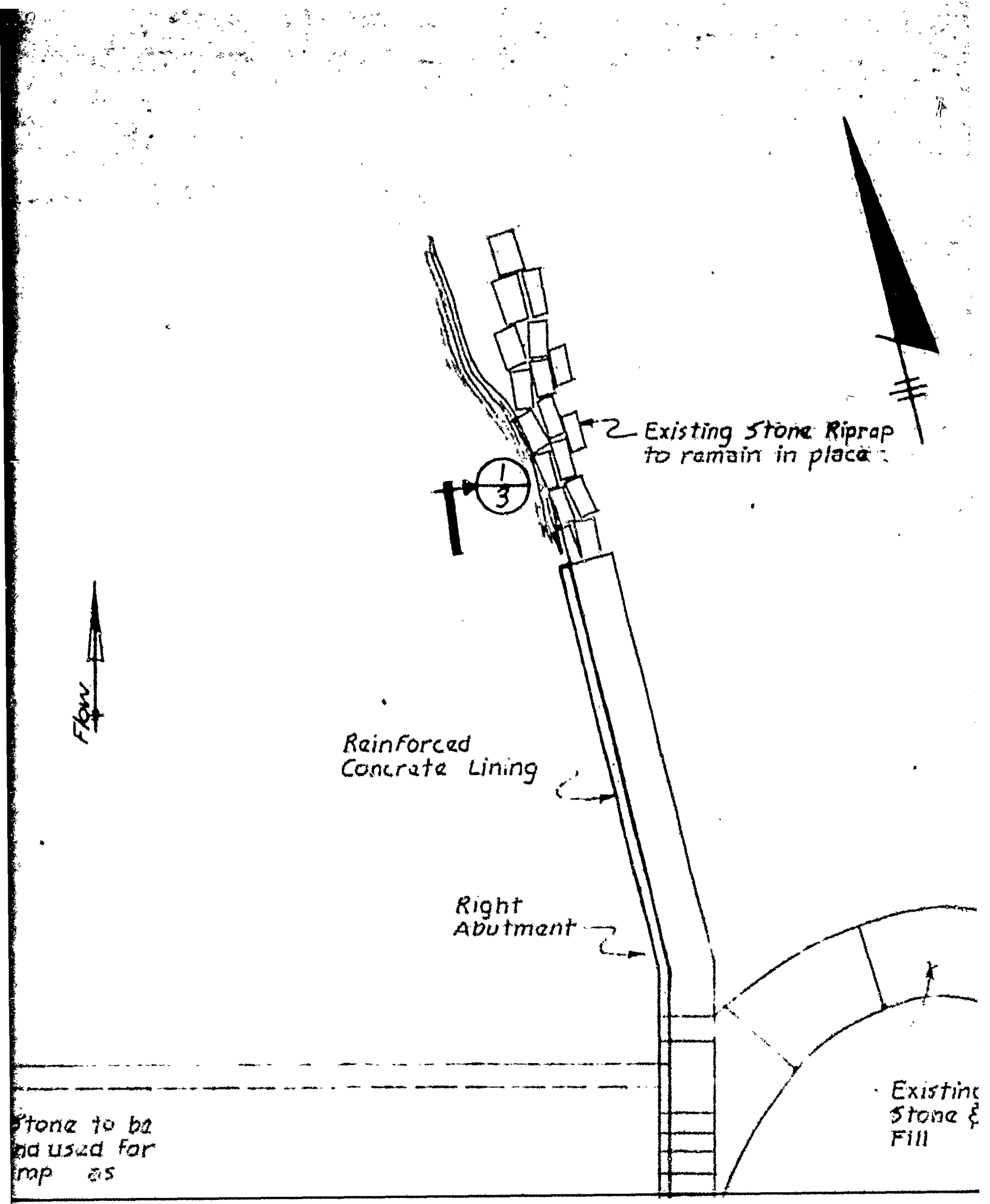


LOCATION PLAN

Scale 1" = 2,640'

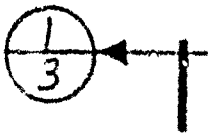
PROJECT SITE




Existing Stone Riprap
to remain in place
1
3
Flow
Reinforced
Concrete Lining
Right
Abutment
Existing
Stone &
Fill
Stone to be
ha used for
mp as

METHOD OF SECTIONING

The drawing upon which a section, view or de
taken and the drawing upon which the sec
detail has been shown is cross referenced wi
follows:

Drawing where section is taken.	
	The number in the upper ha circle is the section numbe bottom number refers to number on which the sect be found.
Drawing where section is shown.	
SECTION 	This is shown under each se The top number is the secti The bottom number refers t sheet number where the se been taken.

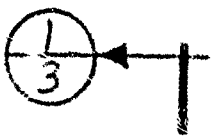
GENERAL NOTES

1) All elevations refer to the USC & GS d
2) All concrete placed in the work shall b entrained and shall have a minimum a compressive strength of 4000 psi.
3) All exposed edges of concrete shall b fered ¾-inch.
4) All reinforcing steel shall be bent to isting stone masonry, embedded items, piling etc., a minimum of 1-inch.
5) All reinforcing steel shall be detailed i ance with ACI 315, "Manual of Standar

ting
e & Gravel

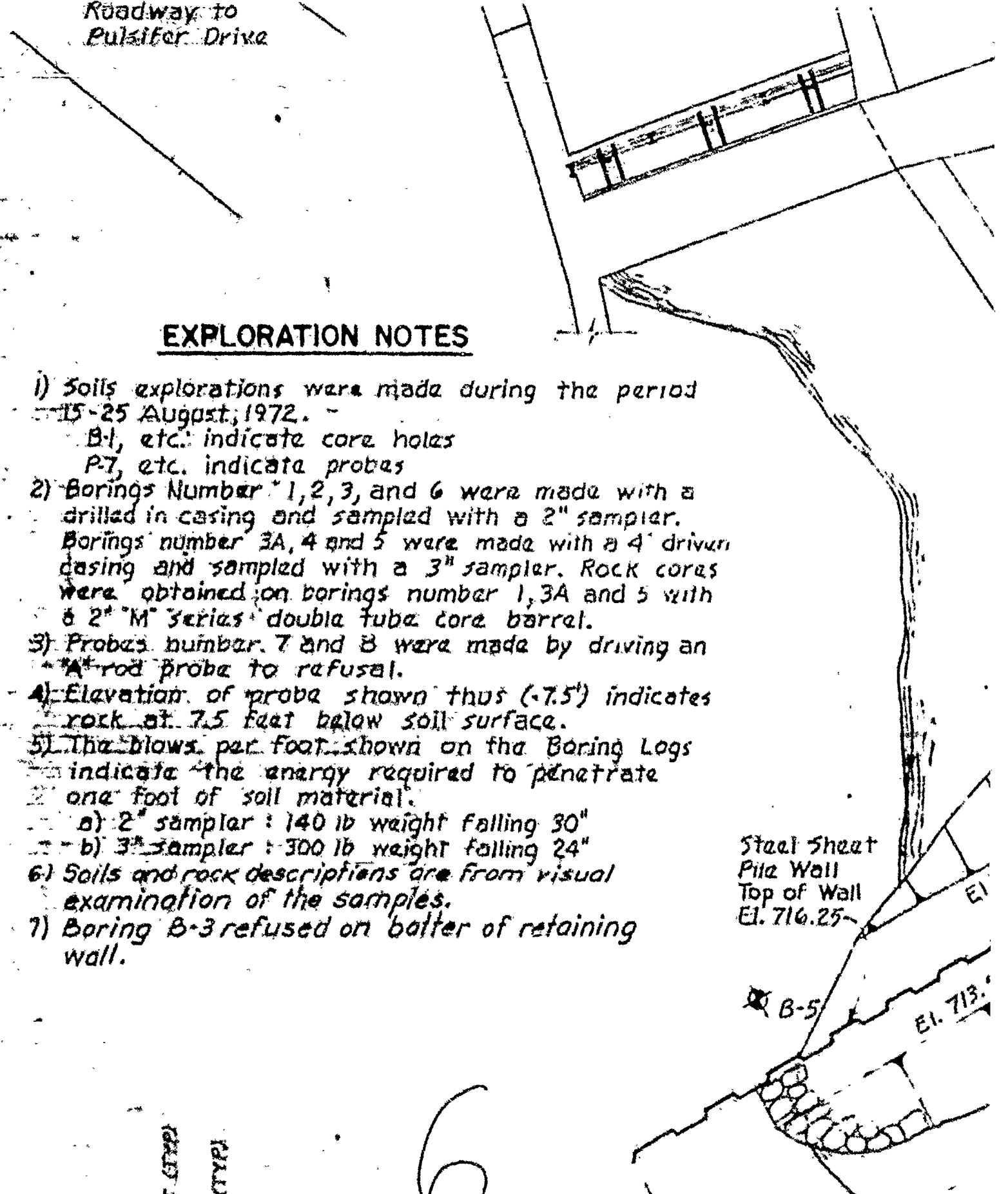
METHOD OF SECTIONING

The drawing upon which a section, view or detail has been taken and the drawing upon which the section, view or detail has been shown is cross referenced with symbols as follows:

Drawing where section is taken.	
	The number in the upper half of the circle is the section number. The bottom number refers to the sheet number on which the section can be found.
Drawing where section is shown.	
SECTION 	This is shown under each section. The top number is the section number. The bottom number refers to the sheet number where the section has been taken.

GENERAL NOTES

1) All elevations refer to the USC & GS datum.
2) All concrete placed in the work shall be air-entrained and shall have a minimum 28 day compressive strength of 4000 psi.
3) All exposed edges of concrete shall be chamfered ¾-inch.
4) All reinforcing steel shall be bent to clear existing stone masonry, embedded items, sheet piling, etc., a minimum of 1-inch.
5) All reinforcing steel shall be detailed in accordance with ACI 315 "Manual of Standard Practice



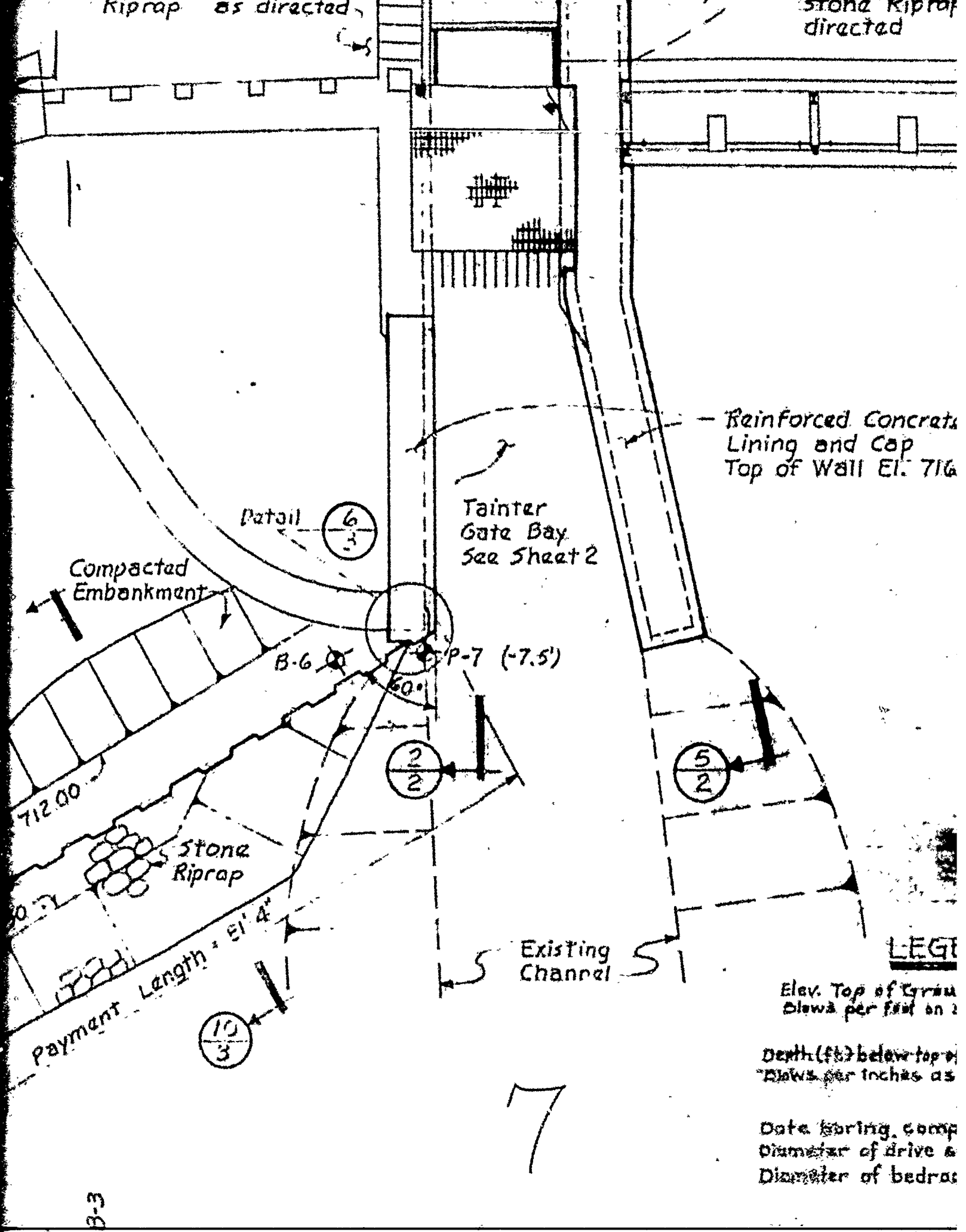
EXPLORATION NOTES

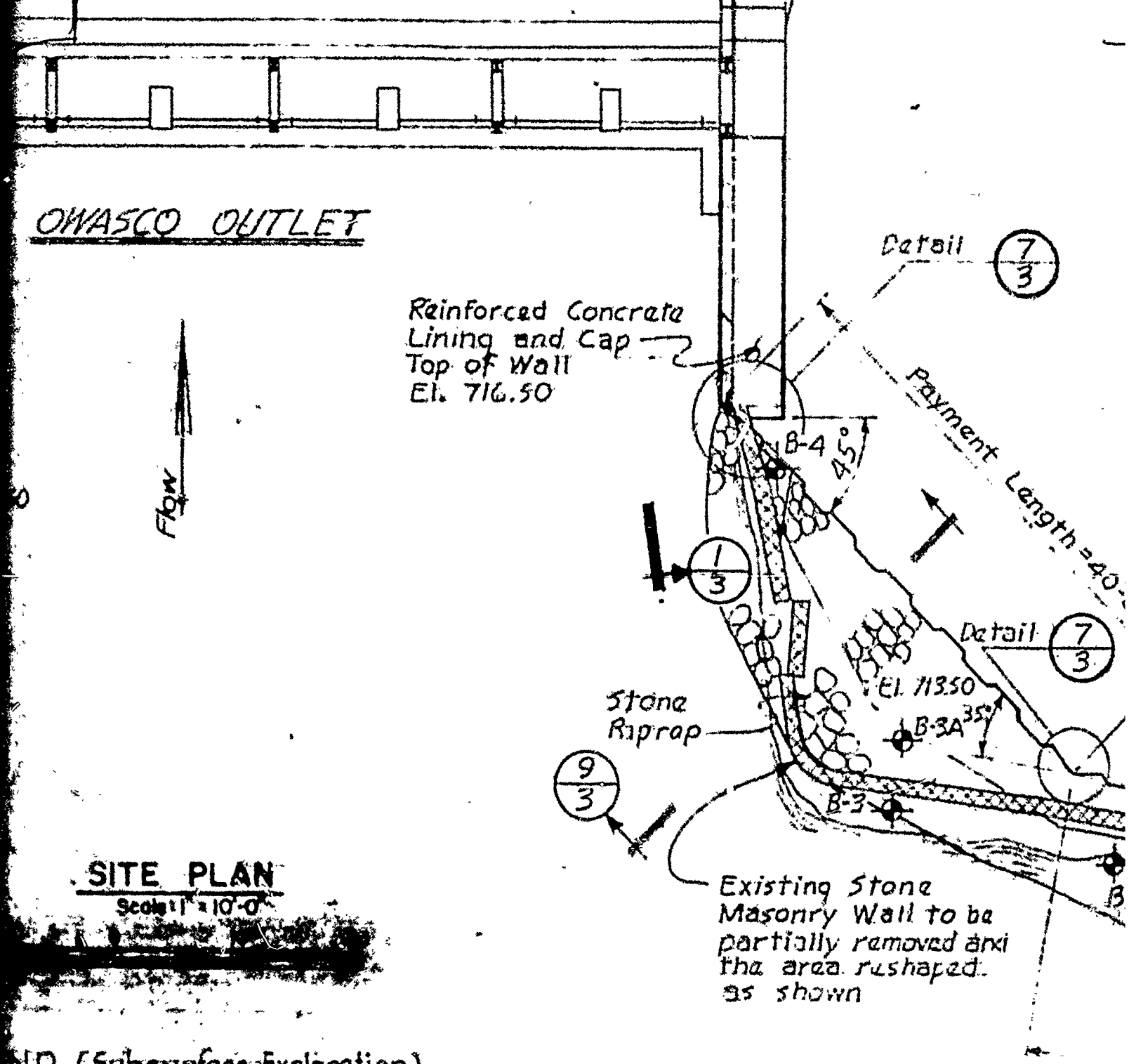
1) Soils explorations were made during the period 15-25 August, 1972.
   B-1, etc. indicate core holes
   P-7, etc. indicate probes
2) Borings Number 1, 2, 3, and 6 were made with a drilled in casing and sampled with a 2" sampler. Borings number 3A, 4 and 5 were made with a 4" driven casing and sampled with a 3" sampler. Rock cores were obtained on borings number 1, 3A and 5 with a 2" "M" Series double tube core barrel.
3) Probes number 7 and 8 were made by driving an "A" rod probe to refusal.
4) Elevation of probe shown thus (-7.5') indicates rock at 7.5 feet below soil surface.
5) The blows per foot shown on the Boring Logs indicate the energy required to penetrate one foot of soil material.
   a) 2" sampler : 140 lb weight falling 30"
   b) 3" sampler : 300 lb weight falling 24"
6) Soils and rock descriptions are from visual examination of the samples.
7) Boring B-3 refused on batter of retaining wall.

6

TH IN FEET (1:20)

FOOT (1:20)


Riprap as directed
Stone Riprap
directed
Reinforced Concrete
Lining and Cap
Top of Wall El. 716
Detail 6/3
Tainter
Gate Bay
See Sheet 2
Compacted
Embankment
B-6
P-7 (-7.5')
60°
2/2
5/2
712.00
Stone
Riprap
Payment Length = 51' 4"
10/3
Existing
Channel
LEGE
Elev. Top of Gran
blows per foot on
Depth (ft) below top
"Blows per inches as
Date boring comp
Diameter of drive
Diameter of bedro
7
B-3



SITE PLAN
Scale 1" = 10'-0"

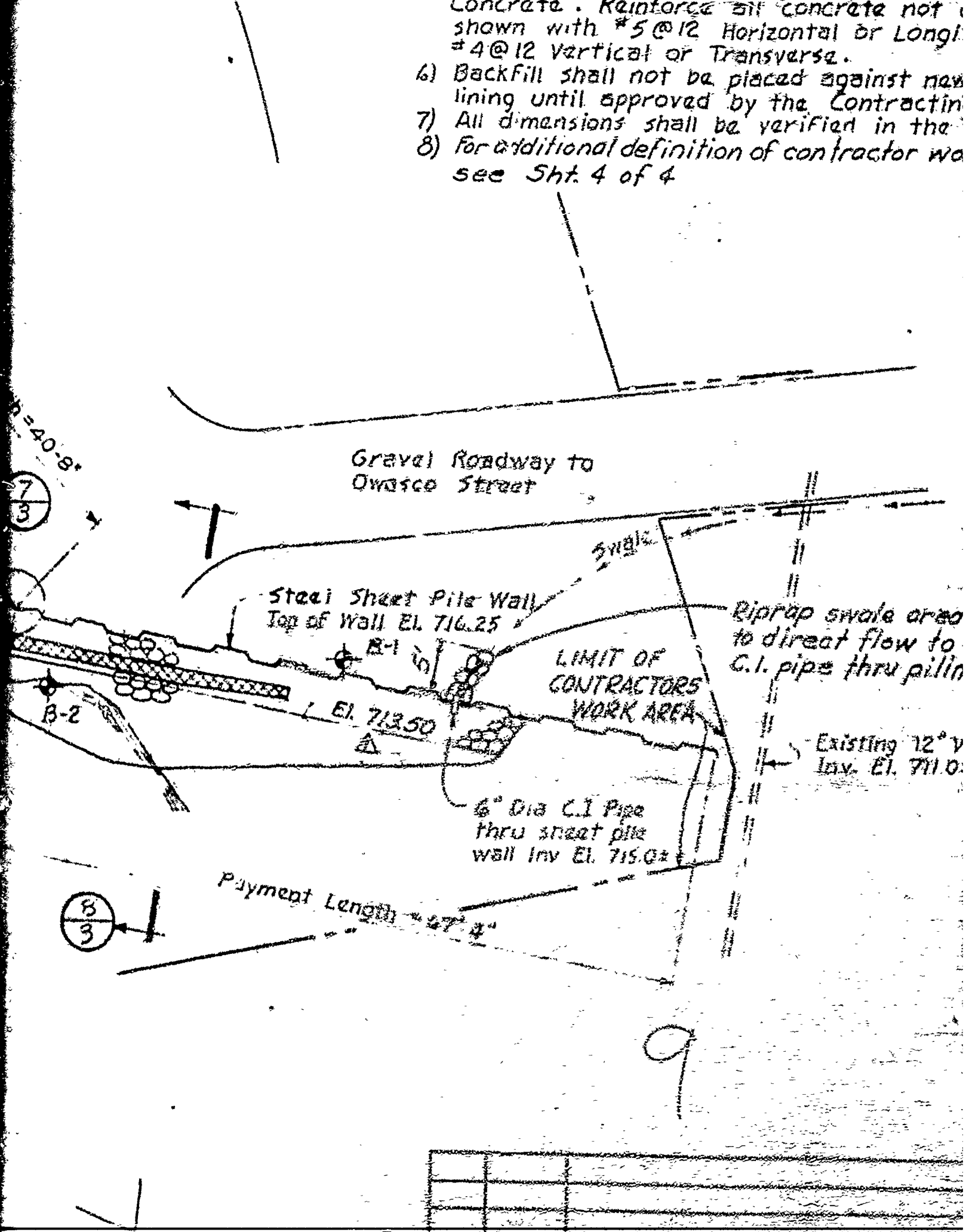
ND (Subsurface Exploration)

El. 715.0±
mpler
ward — 5'
hown — Cap
ted — B-15-72
mpler — 2"
core — 1⅝"

UNITED SOIL CLASSIFICATION SYMBOLS

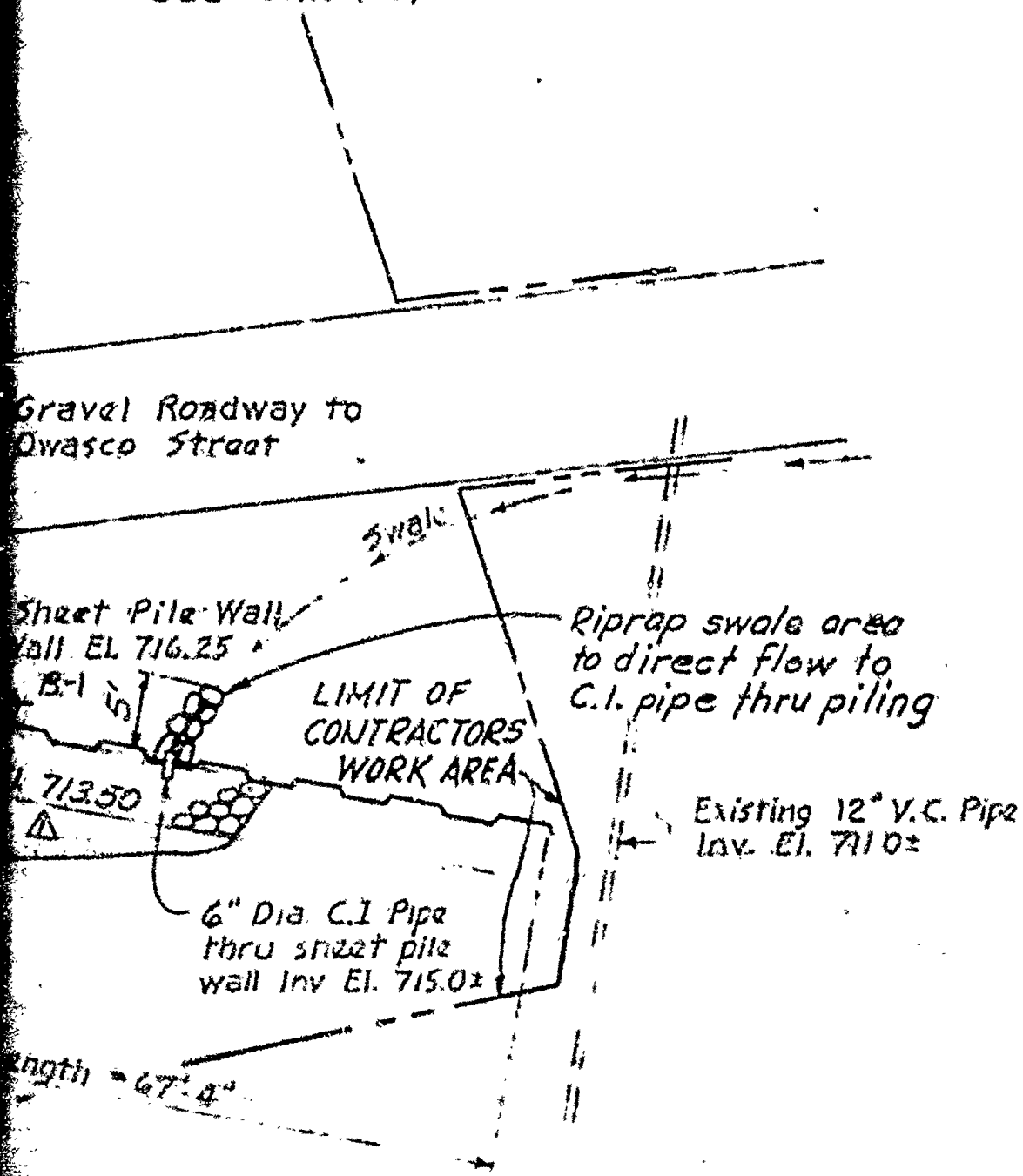
GP	Gravel or sandy gravel, poorly graded
GM	Gravel or sandy gravel, silty
SM	Sand or gravelly sand, silty
ML	Silt, inorganic, low to no plasticity
PT	Peat or highly organic

Concrete. Reinforce all concrete not
shown with #5 @ 12 Horizontal or Longi
#4 @ 12 Vertical or Transverse.
6) Backfill shall not be placed against new
lining until approved by the Contractin
7) All dimensions shall be verified in the
8) For additional definition of contractor wo
see Sht. 4 of 4



ACI 318, "Building Code Requirements for Reinforced Concrete". Reinforce all concrete not otherwise shown with #5 @ 12 Horizontal or Longitudinal, and #4 @ 12 Vertical or Transverse.

6) Backfill shall not be placed against new concrete lining until approved by the Contracting Officer.
7) All dimensions shall be verified in the Field.
8) For additional definition of contractor work areas, see Sht. 4 of 4



were obtained on borings number 1, 3A and 5 with a 2" "M" series double tube core barrel.

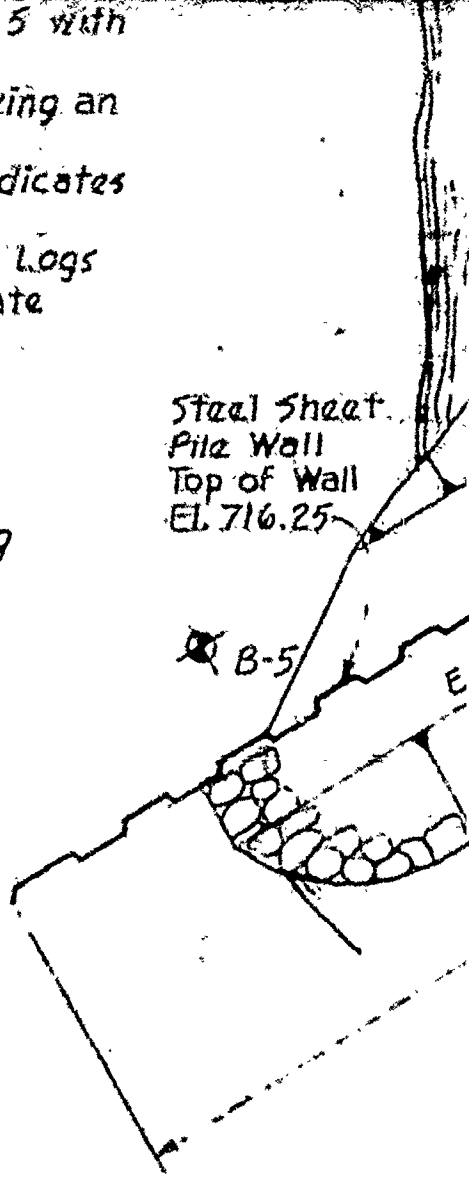
3) Probes number 7 and 8 were made by driving an "A" rod probe to refusal.

4) Elevation of probe shown thus (-7.5') indicates rock at 7.5 feet below soil surface.

5) The blows per foot shown on the Boring Logs indicate the energy required to penetrate one foot of soil material.
   a) 2" sampler : 140 lb weight falling 30"
   b) 3" sampler : 300 lb weight falling 24"

6) Soils and rock descriptions are from visual examination of the samples.

7) Boring B-3 refused on batter of retaining wall.



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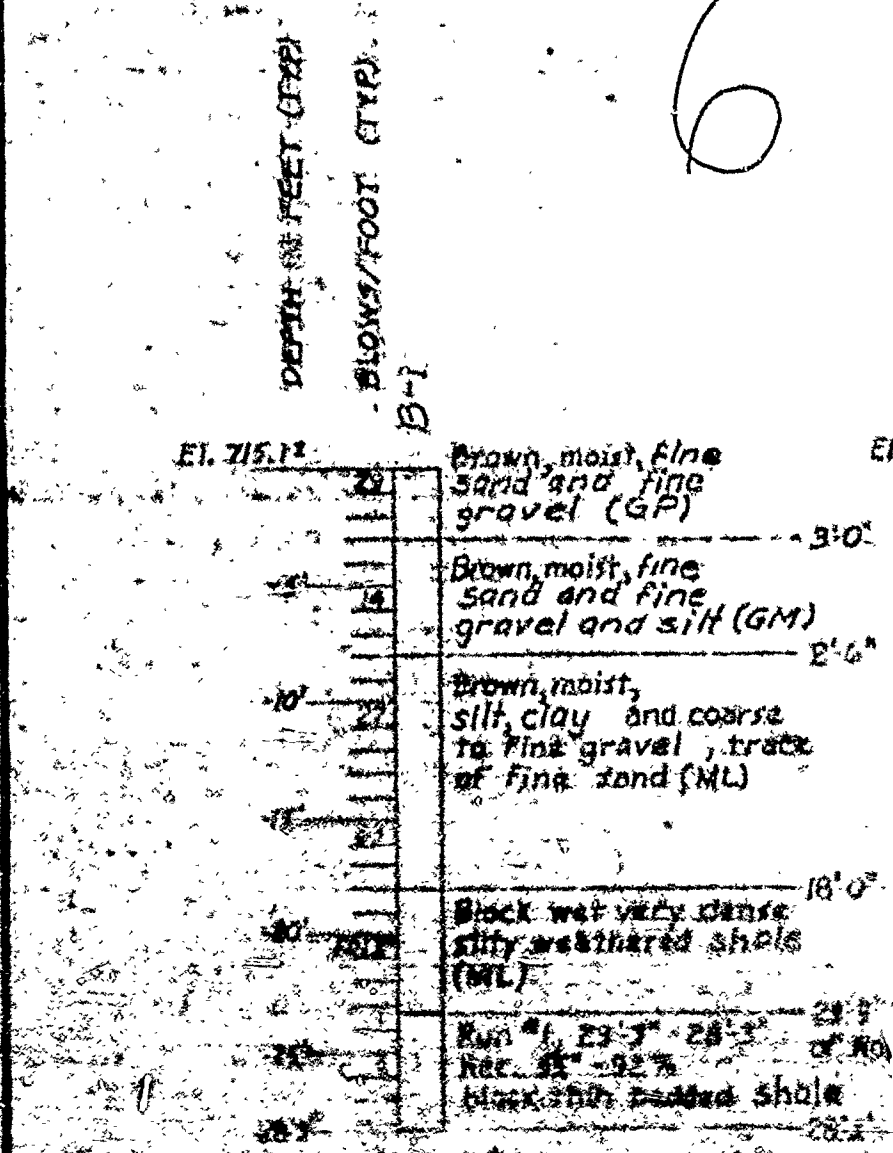
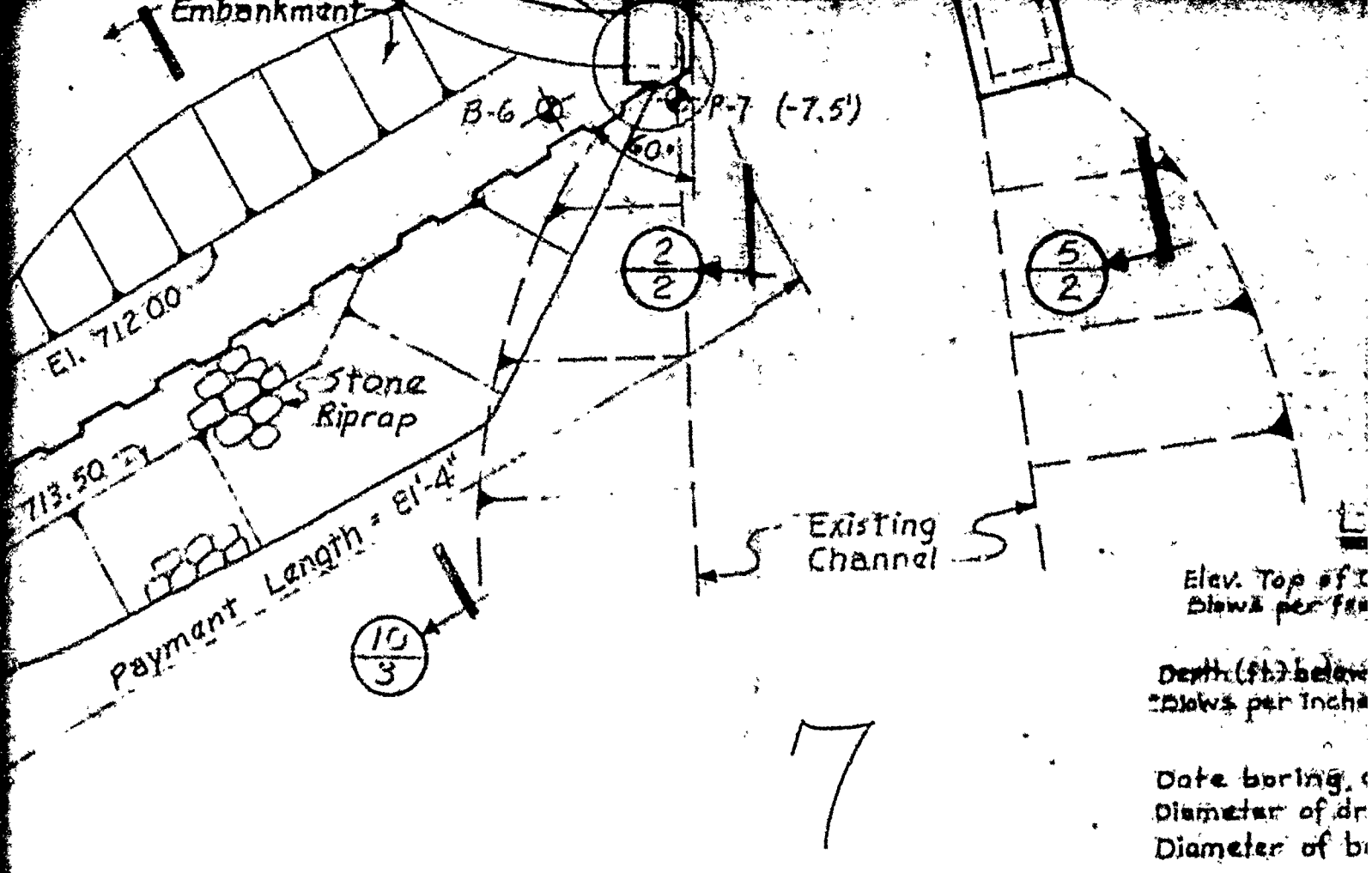


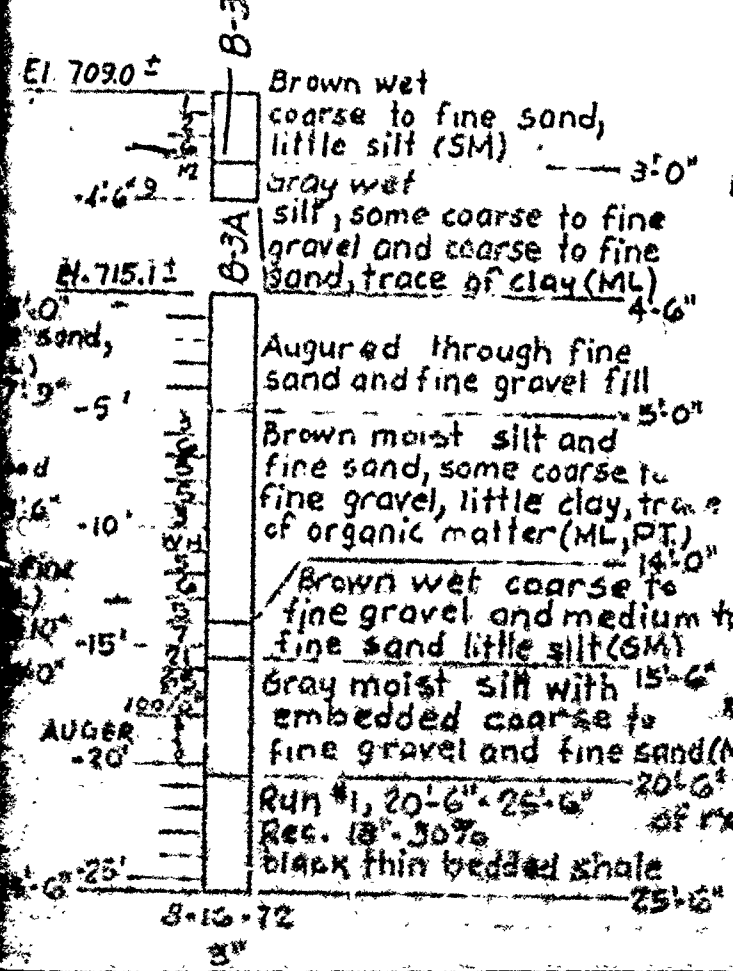


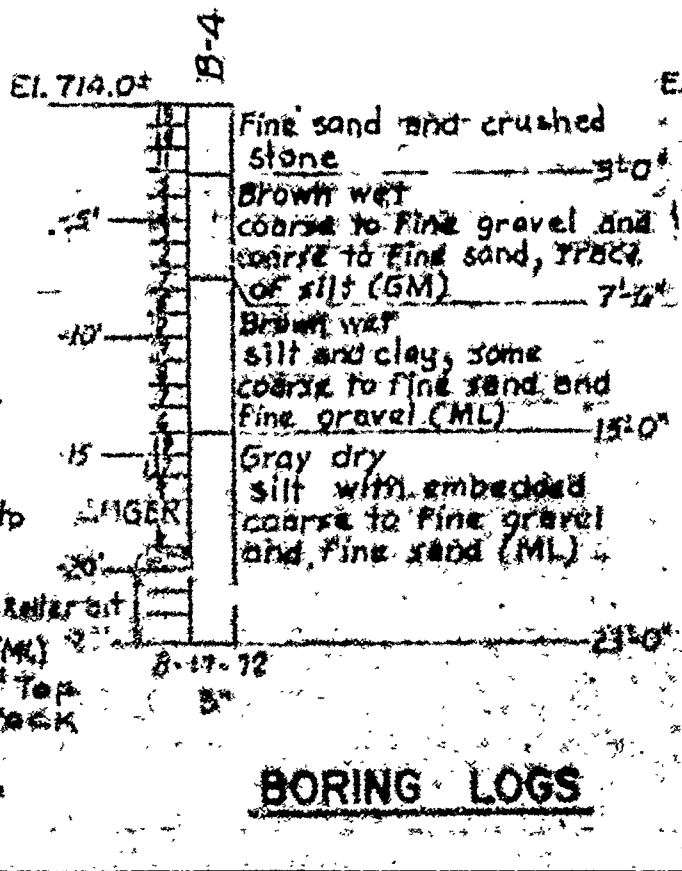
7

Elev. Top of I
Blows per fo

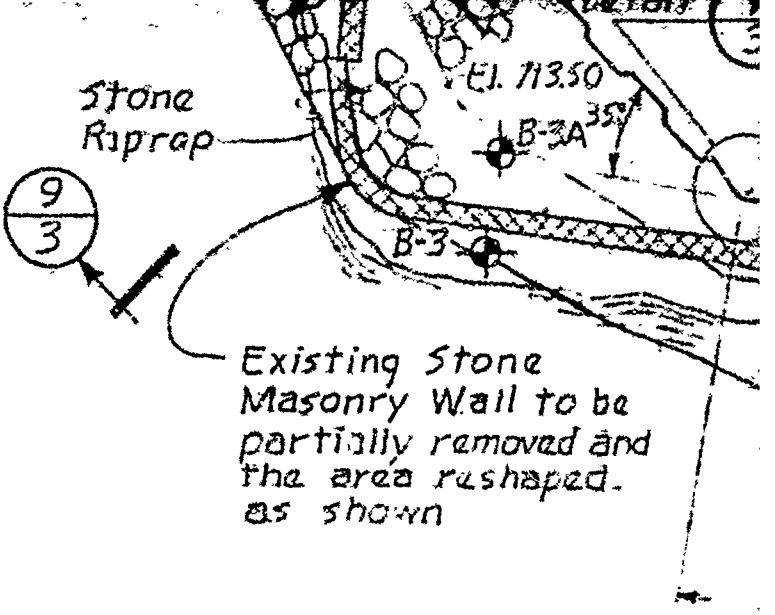
Depth (ft.) below
Blows per Inch

Date boring
Diameter of dr
Diameter of b





BORING LOGS



SITE PLAN

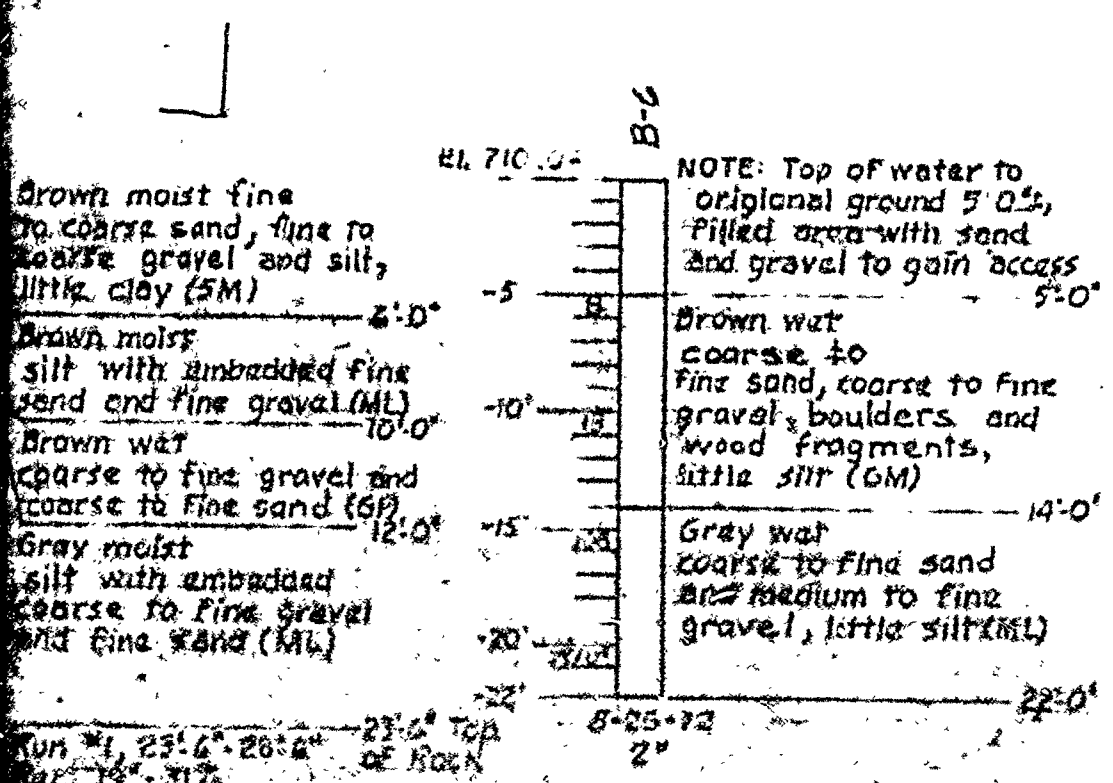
Scale 1" = 10'-0"

GEND (Subsurface Exploration)

ound → El. 715.0±
n sampler → 2"
p of ground → 5'
s shown → 6"
mpleted → 8-15-72
e sampler → 2"
rock core → 1 5/16"

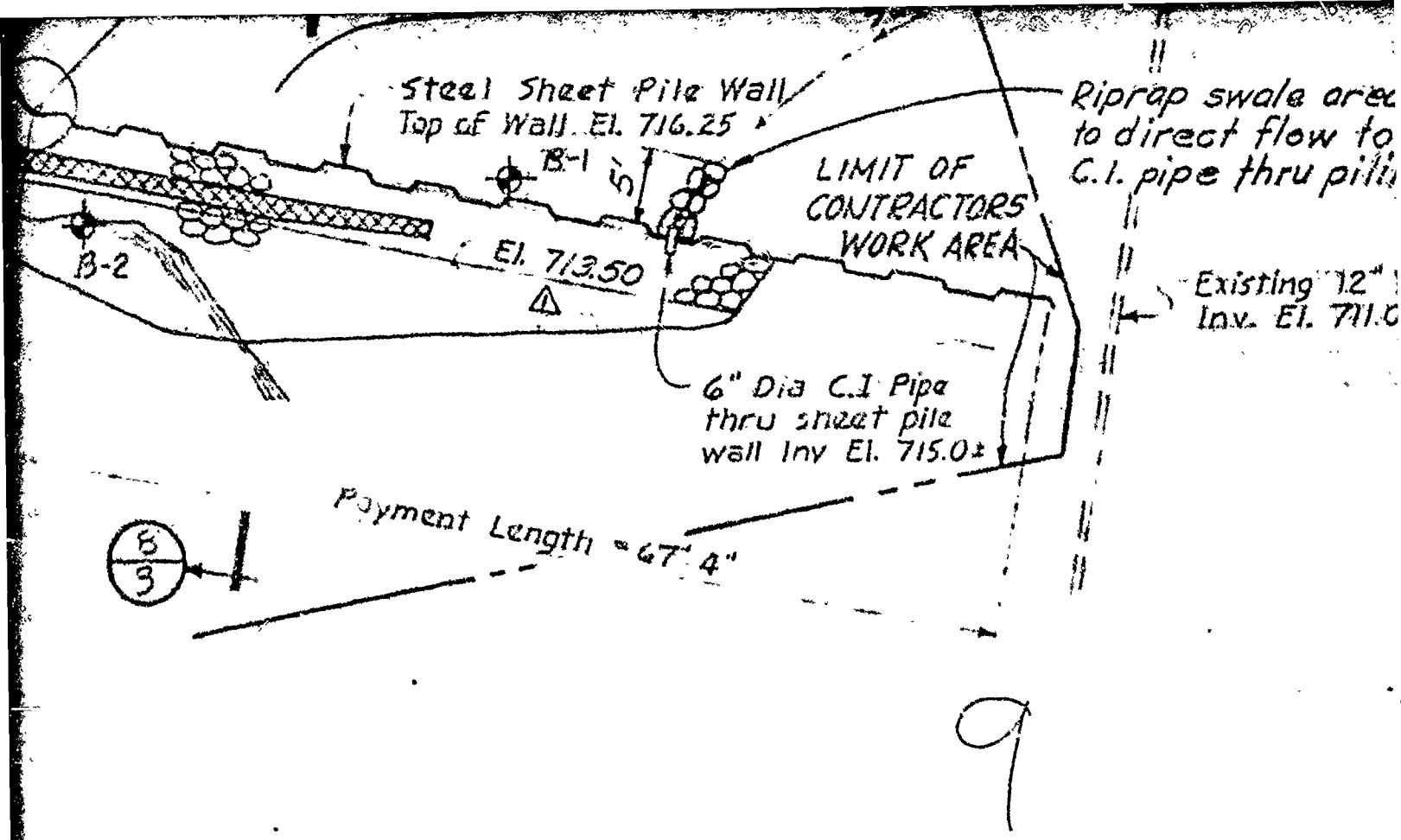
UNITED SOIL CLASSIFICATION SYMBOLS

GP	Gravel or sandy gravel, poorly graded
GM	Gravel or sandy gravel, silty
SM	Sand or gravelly sand, silty
ML	Silt, inorganic, low to no plasticity
PT	Peat or highly organic



INDE

SHEET NUMBER



REV.	DATE	DESCRIPTION
1	11/14/72	Revised in accordance with an

O'BRIEN & GERE ENGINEERS, INC.
Syracuse, New York

U.S. ARMY

DESIGNED: GAA
DRAWN: DRT & GPK
CHECKED: RKM
SUBMITTED: [signature]
RECOMMENDED: [signature]
CHIEF, ENGRG. DIVISION, BUFFALO DISTRICT OFFICE
APPROVED: [signature]
COL., C.E. DISTRICT ENGINEER

STATE DA
OWASCO
AUBURN,

SITE PLAN & G

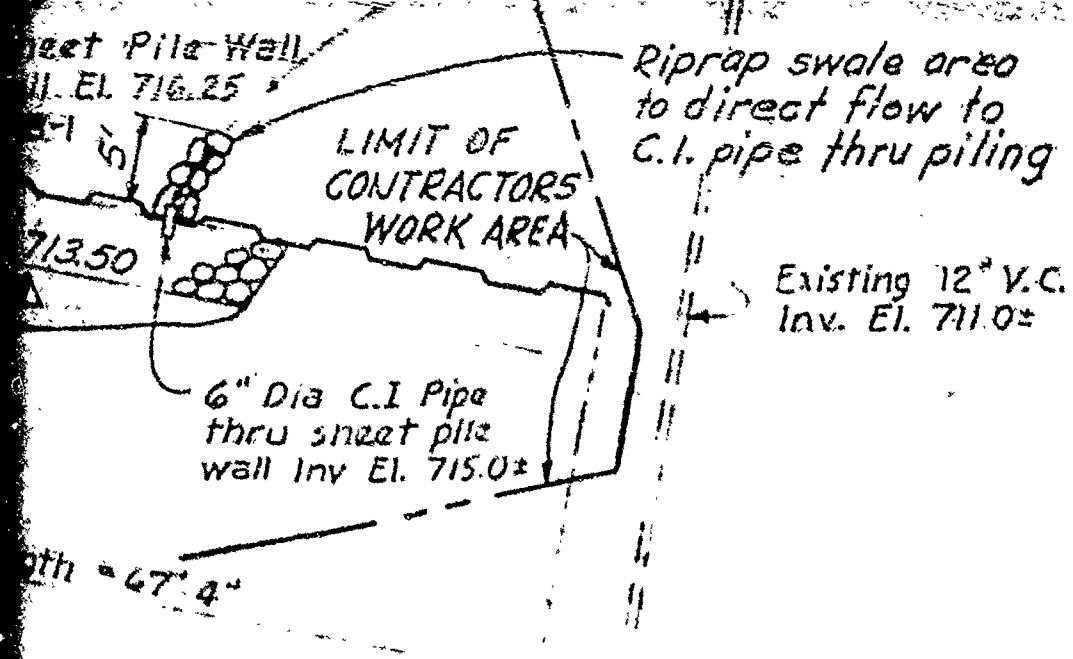
DATE:
SCALE:

TO ACCOMPANY SPECIFICATIONS SERIAL NO. DACW49-73-B-0021

SHEET

INDEX TO DRAWINGS

TITLE
SITE PLAN & GENERAL NOTES
LEFT ABUTMENT & CENTER PIER SECTIONS & DETAILS
RIGHT ABUTMENT & MISCELLANEOUS SECTIONS & DETAILS
EXISTING CONDITIONS - AUGUST, 1972



9

10

REV.	DATE	DESCRIPTION	BY
1	11/14/72	Revised in accordance with amendment 0002	

O'BRIEN & GERE ENGINEERS, INC.
Syracuse, New York

U.S. ARMY ENGINEER DISTRICT, BUFFALO
CORPS OF ENGINEERS
BUFFALO, NEW YORK 14207

DESIGNED: GAA
DRAWN: DRT & GPK
CHECKED: RKM
SUBMITTED: [signature]
RECOMMENDED: [signature]
CHIEF, ENGRG. DIVISION, BUFFALO DISTRICT OFFICE

STATE DAM REPAIRS
OWASCO OUTLET
AUBURN, NEW YORK

SITE PLAN & GENERAL NOTES

APPROVED: [signature]
SOL. CE DISTRICT ENGINEER

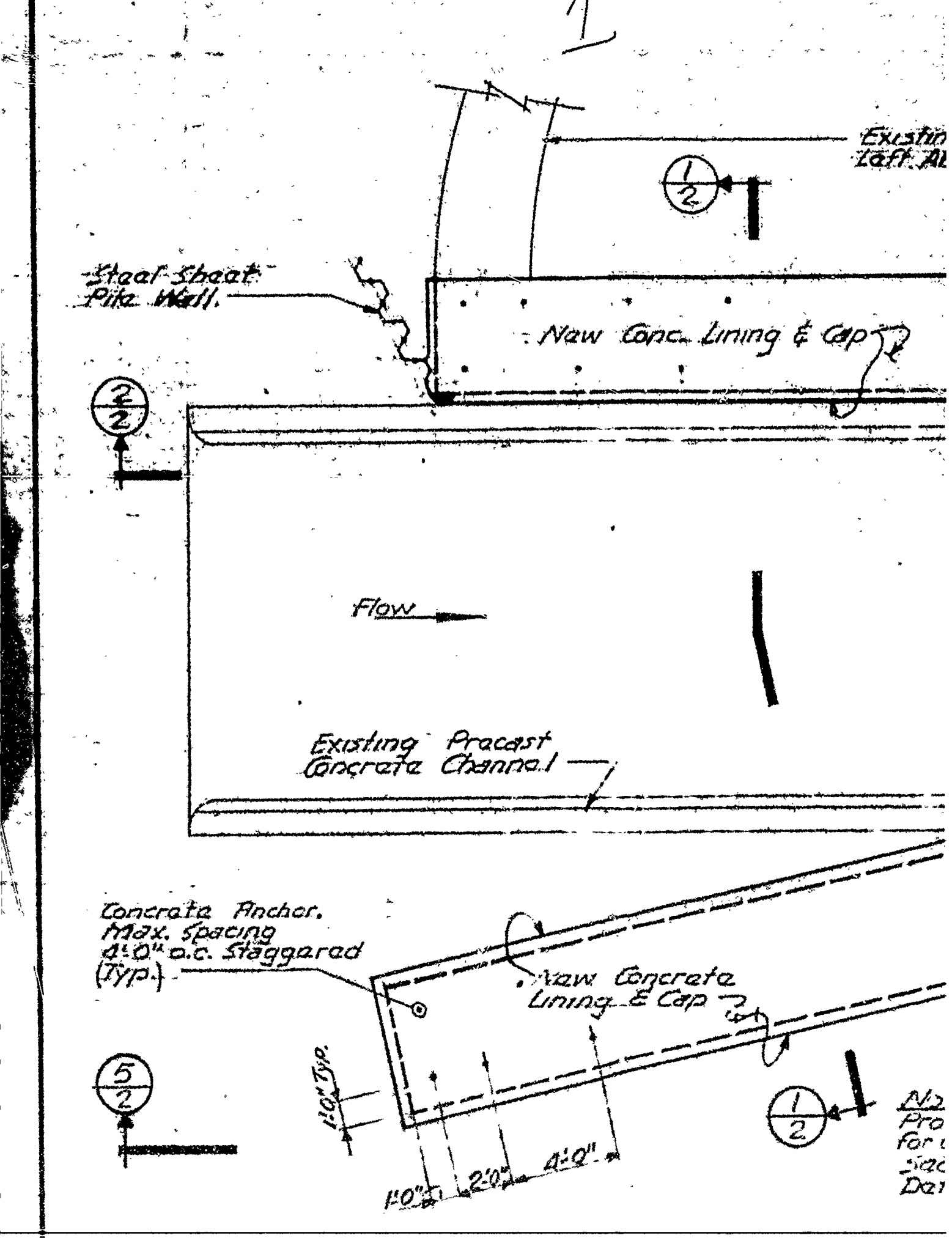
DATE: 20 SEPTEMBER 1972

SCALE: AS SHOWN

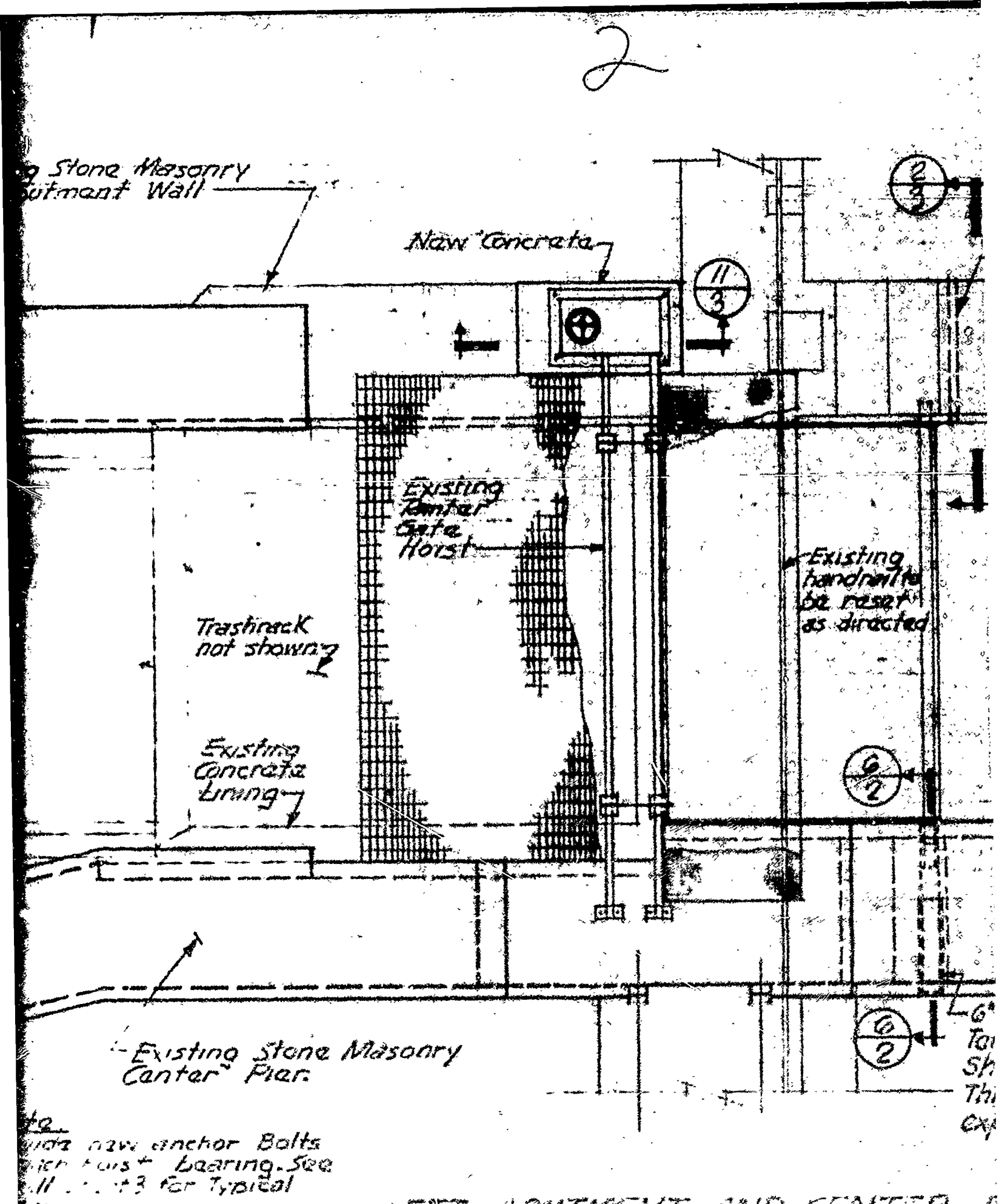
TO ACCOMPANY SPECIFICATIONS, SERIAL NO. DACW49-73-B-0021

DRAWING NUMBER
239-ADR-1/1

SHEET 1 OF 4

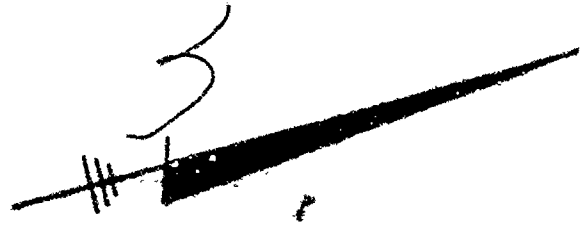

1
Existin
Left Al
1/2
Steel Sheet
Pile Wall
New Conc. Lining & Cap
2/2
Flow
Existing Precast
Concrete Channel
Concrete Anchor.
Max. Spacing
4'-0" o.c. Staggared
(Typ.)
New Concrete
Lining & Cap
5/2
1'-0" Typ.
1'-0"
2'-0"
4'-0"
1/2

2

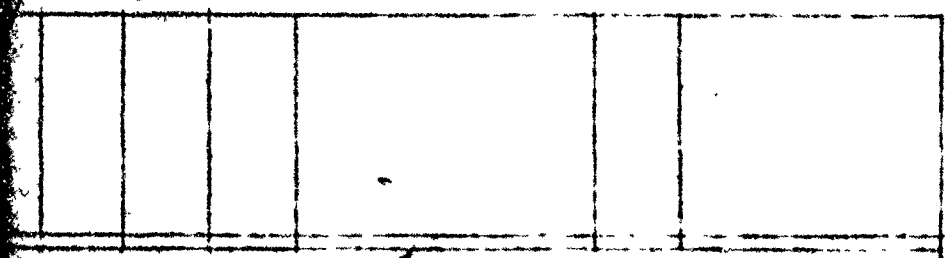


te
vide new anchor Bolts
ich rest on Bearing. See
11 ... 3 for Typical
ail

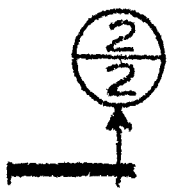
LEFT ABUTMENT AND CENTER P



Weep hole

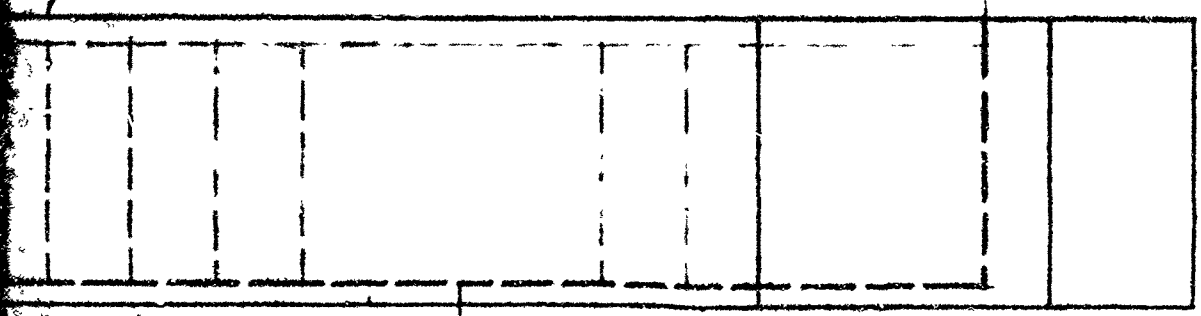


Existing Concrete Lining

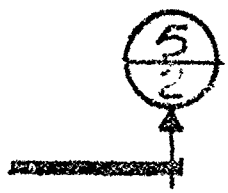


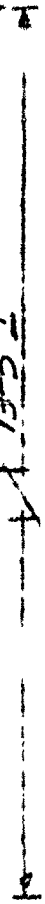
Flow

Deteriorated Concrete Lining to be repaired-Similar to opposite wall. See Sc.. 2 this Sheet and Section 2, Sheet 3.



6"ID Pipe Sleeve for Tainter Gate Bearing Shaft removal. Provide threaded cap for exposed end.



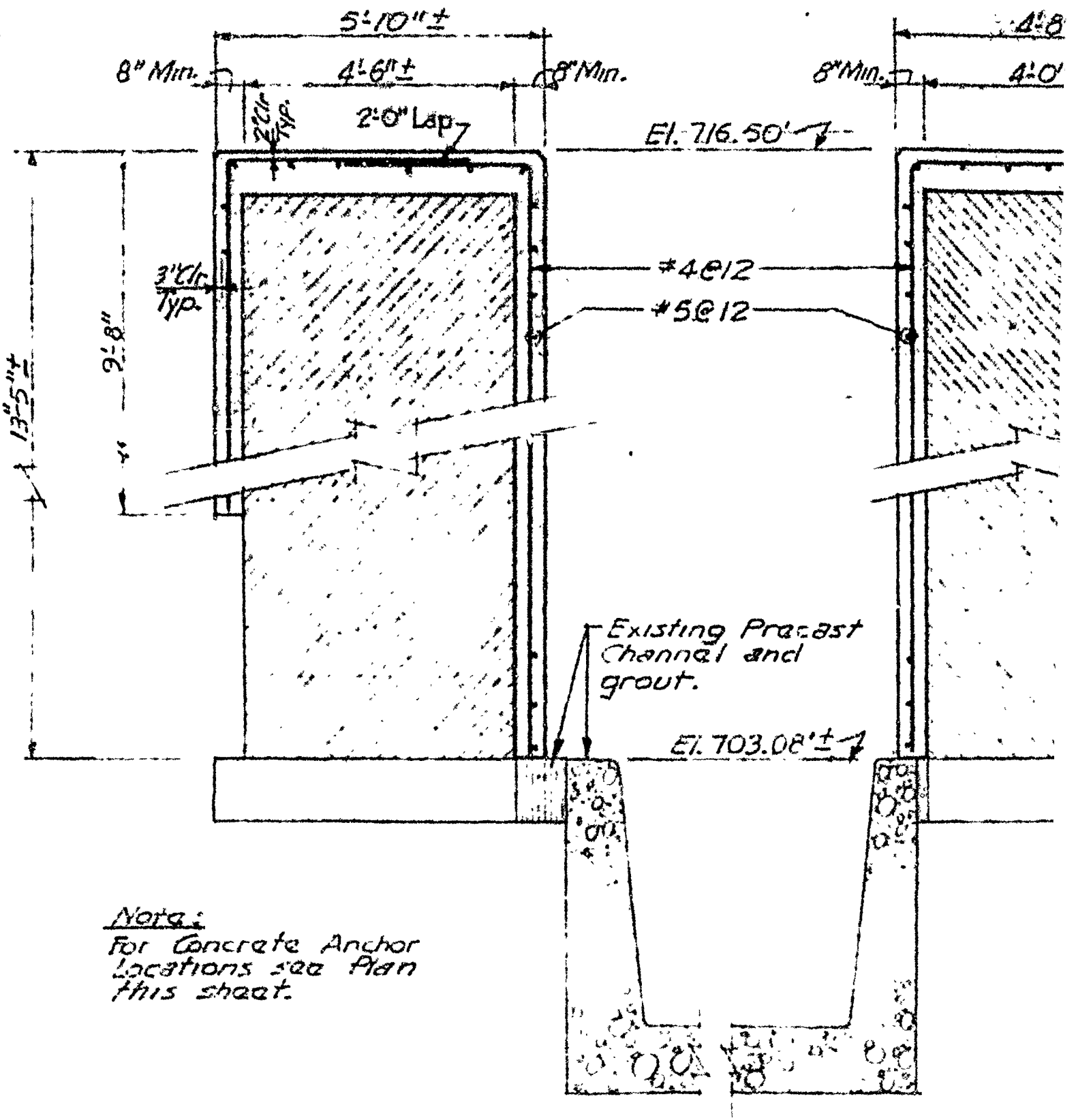


PIER - PLAN

Existing stone masonry

Existing concrete lining

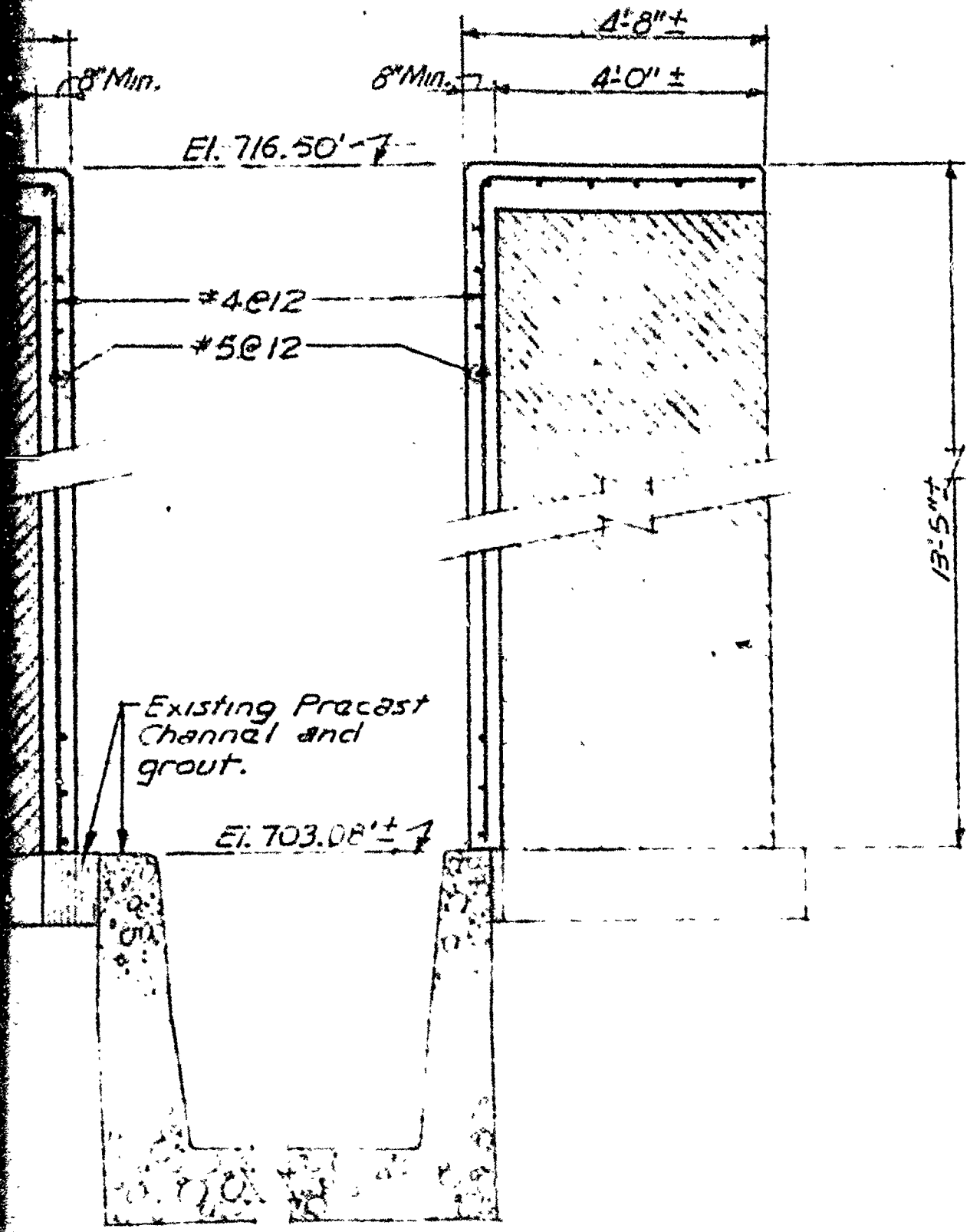
1 4



Note:
For Concrete Anchor Locations see Plan this sheet.

SECTION 1/2
Scale: 1/2" = 1'-0"

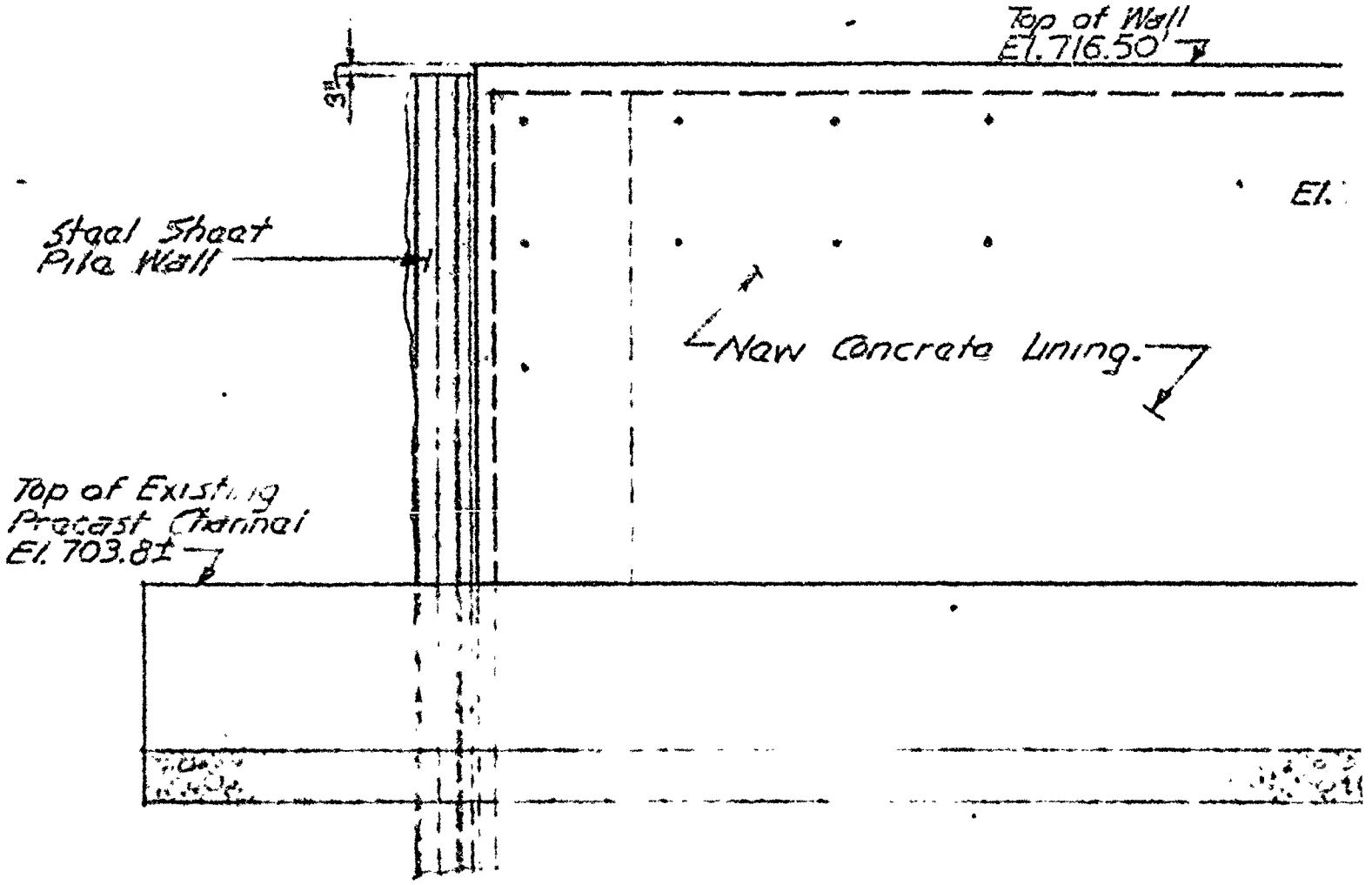
ting 6'-7" ±



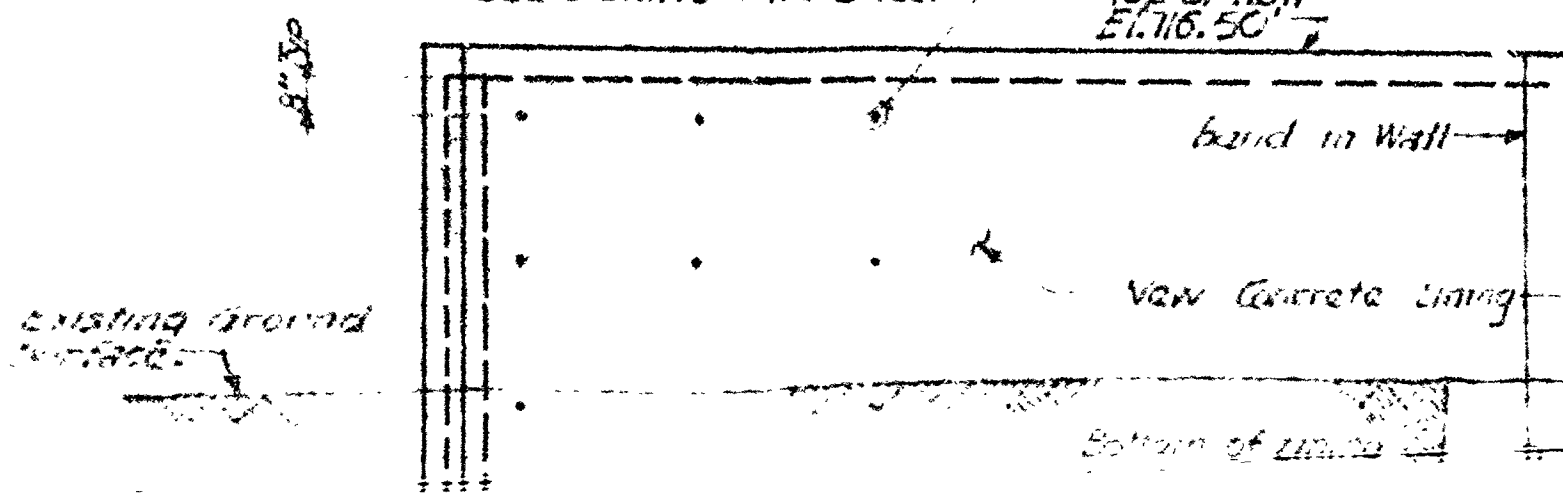
SECTION 1/2

Scale: ½" = 1'-0"

6

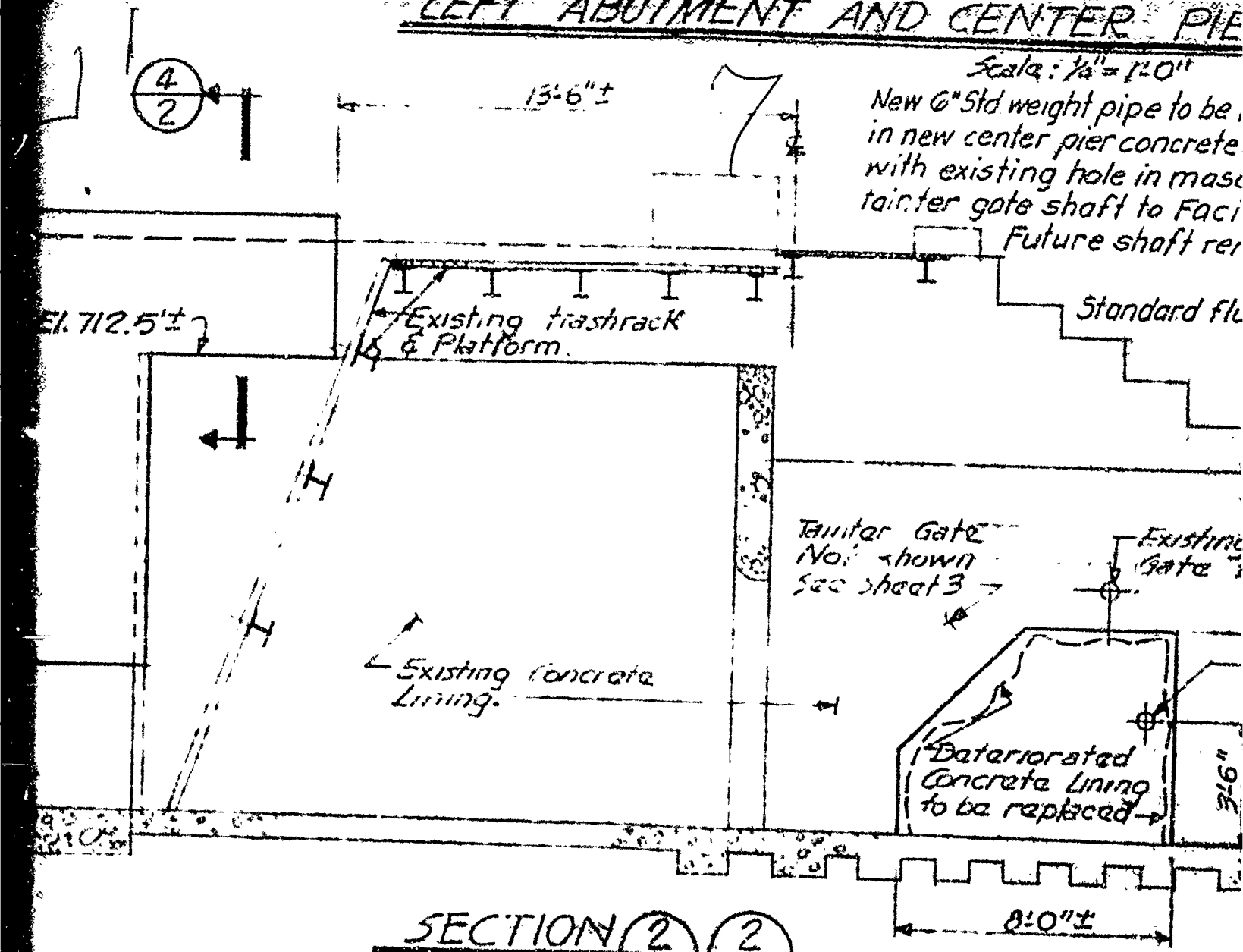


Grouted in reinforcing bar anchors. Max. spacing @ 3:0 o.c. Vert and 4:0 o.c. Horiz. Typ all faces. For installation see Details this sheet →



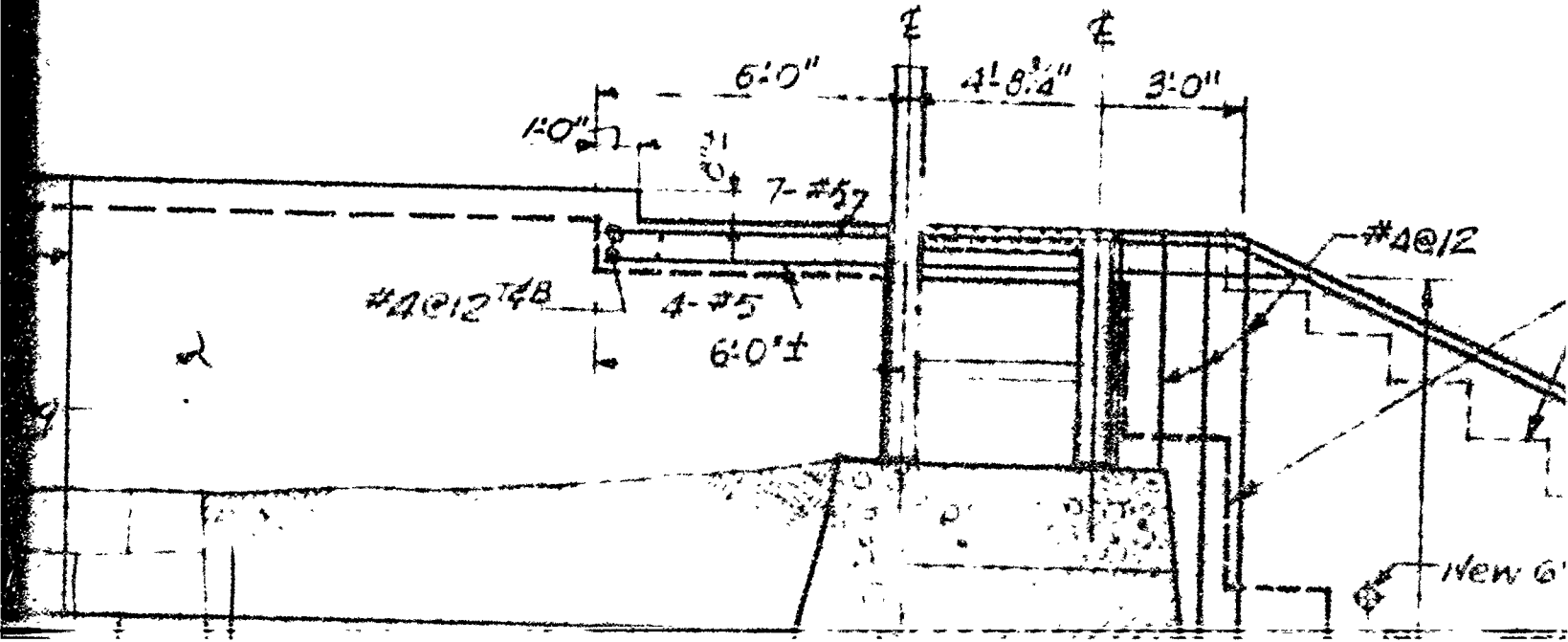
LEFT ABUTMENT AND CENTER PIE

Scale: 1/4"=1'-0"

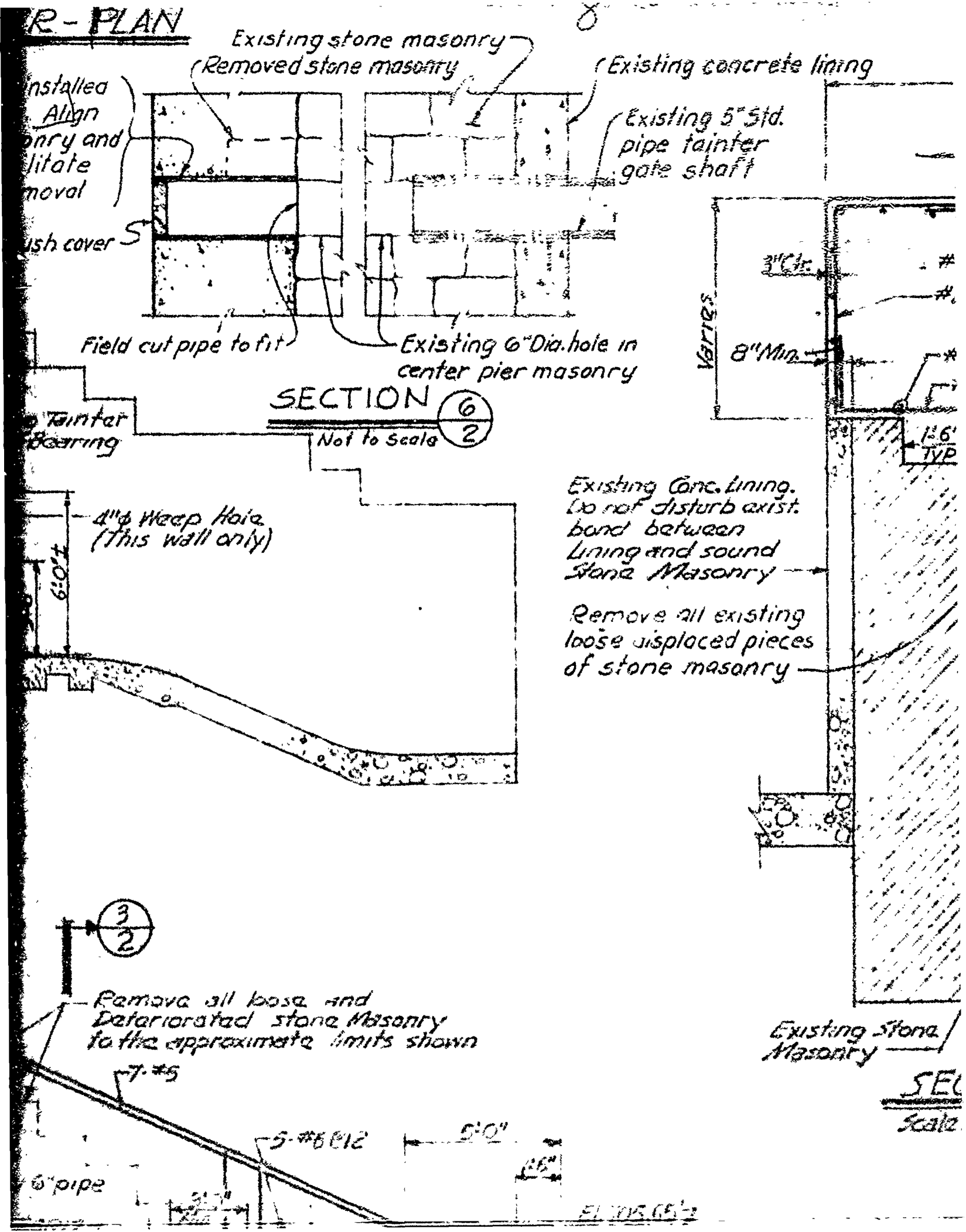


SECTION 2/1 2/2

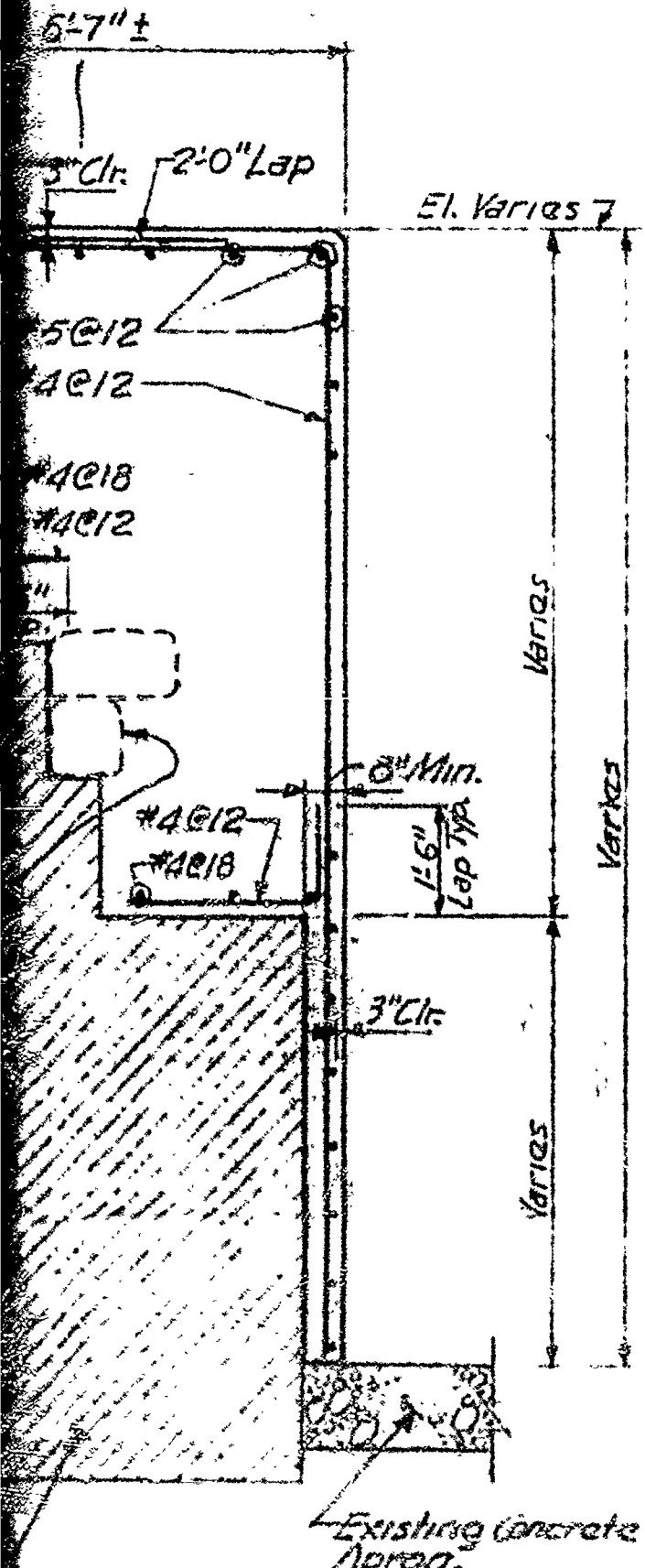
Scale: 1/4"=1'-0"



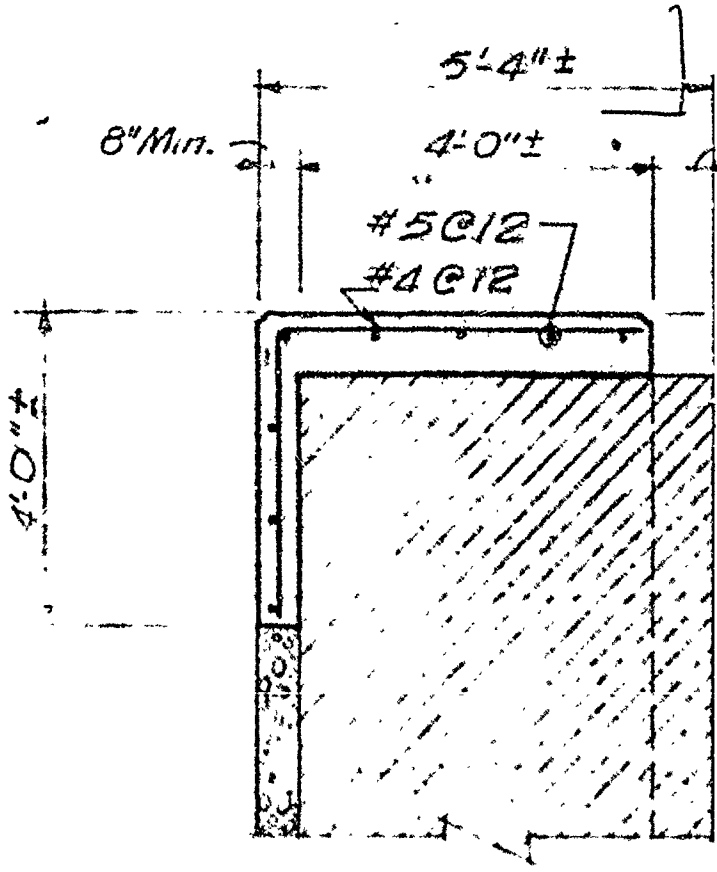
R - PLAN


Existing stone masonry
Removed stone masonry
Existing concrete lining
Existing 5" Std. pipe tainter gate shaft
nstalled
Align
onry and
litate
moval
ush cover
Field cut pipe to fit
Existing 6" Dia. hole in center pier masonry
SECTION 6/2
Not to Scale
Tainter Bearing
4" ϕ Weep Hole (This wall only)
6'-0"±
Varies
8" Min.
3" Clr.
1'-6" TYP
Existing Conc. Lining. Do not disturb exist. bond between Lining and sound Stone Masonry
Remove all existing loose displaced pieces of stone masonry
3/2
Remove all loose and Deteriorated stone Masonry to the approximate limits shown
Existing Stone Masonry
7-#5
5-#6 @12
5'-0"
6" pipe
SEC
Scale

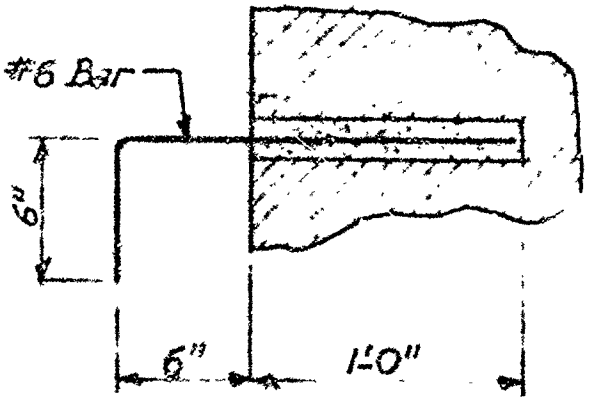
SECTION 1/2
Scale: ½" = 1'-0"



SECTION 3/2
Scale: ½" = 1'-0"

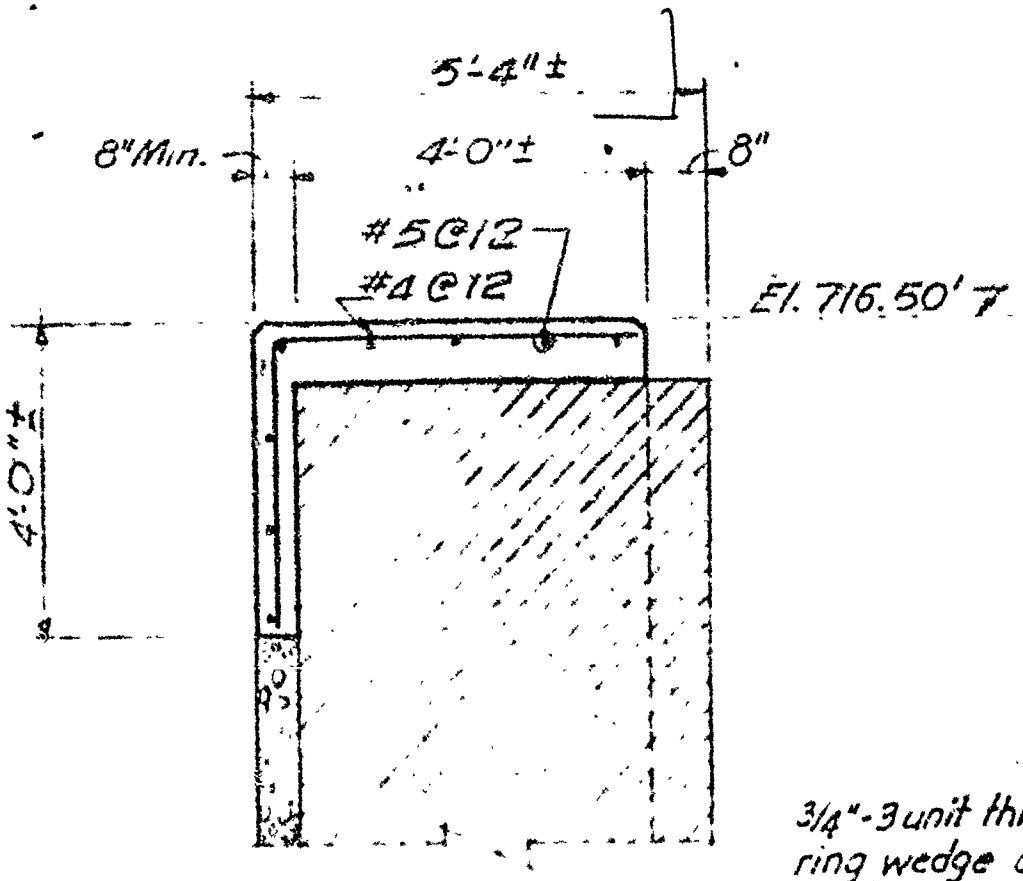


SECTION 4/2
Scale: ½" = 1'-0"

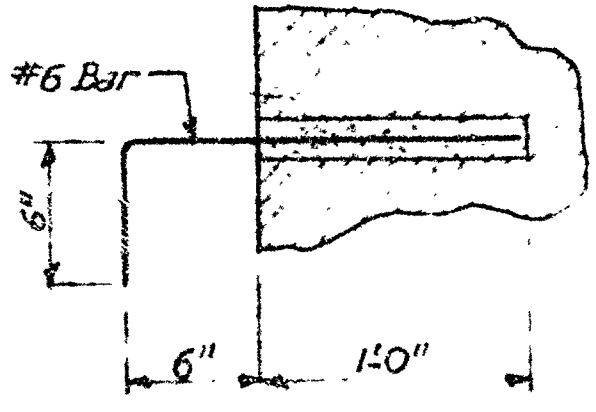


GROUTED-IN REINFORCING BAR ANCHORS
Scale: 1½" = 1'-0"

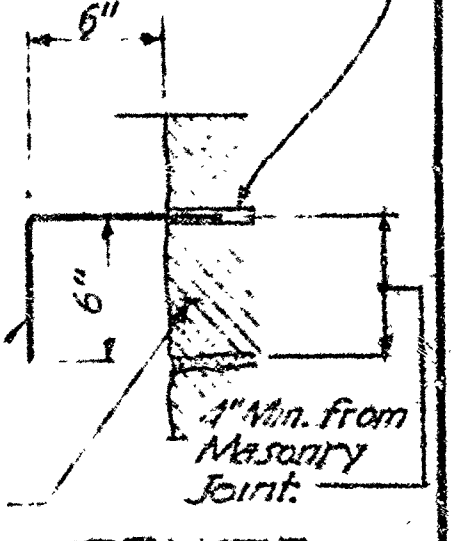
SECTION 1/2
Scale: 1/2" = 1'-0"



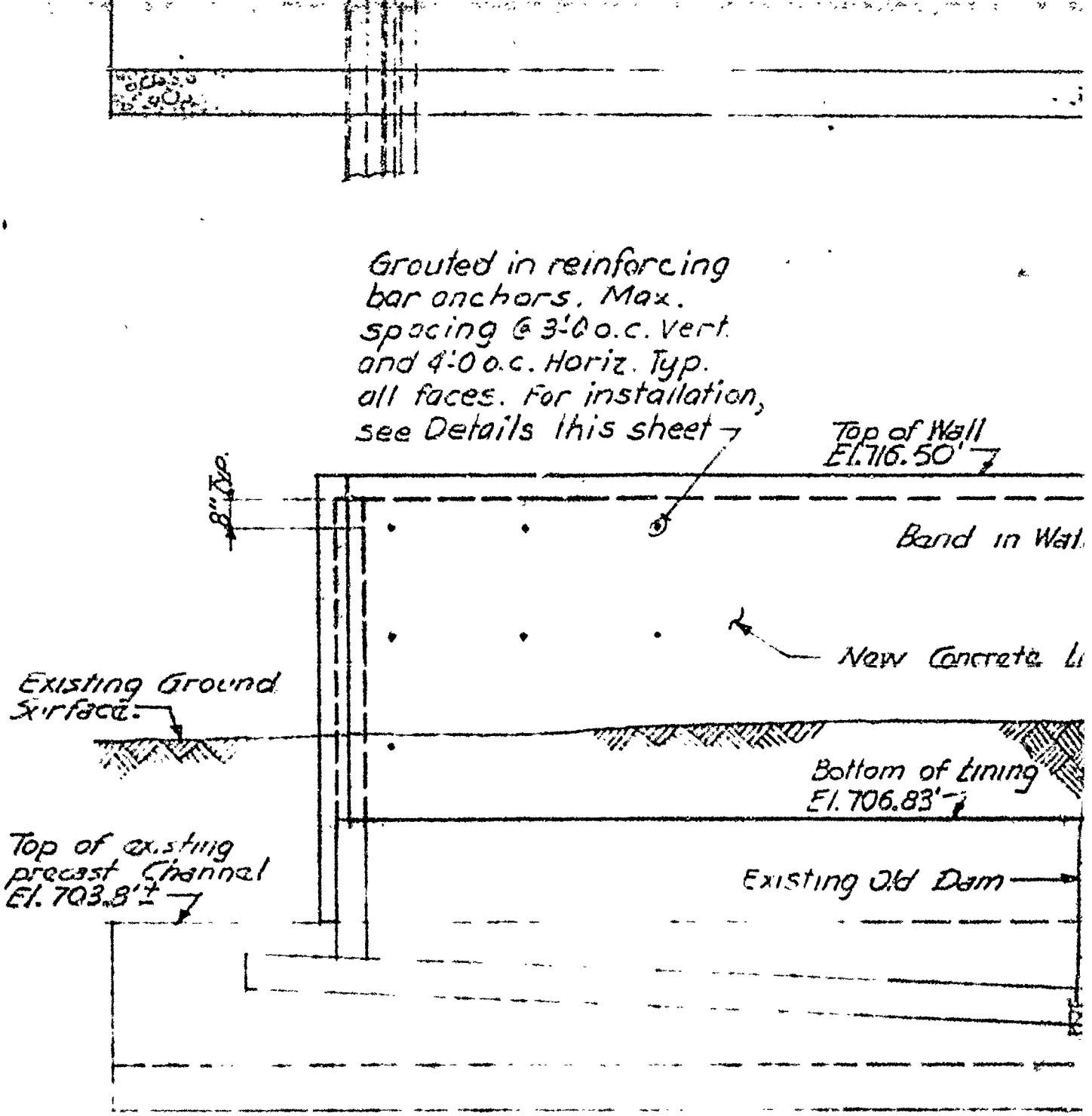
SECTION 4/2
Scale: 1/2" = 1'-0"

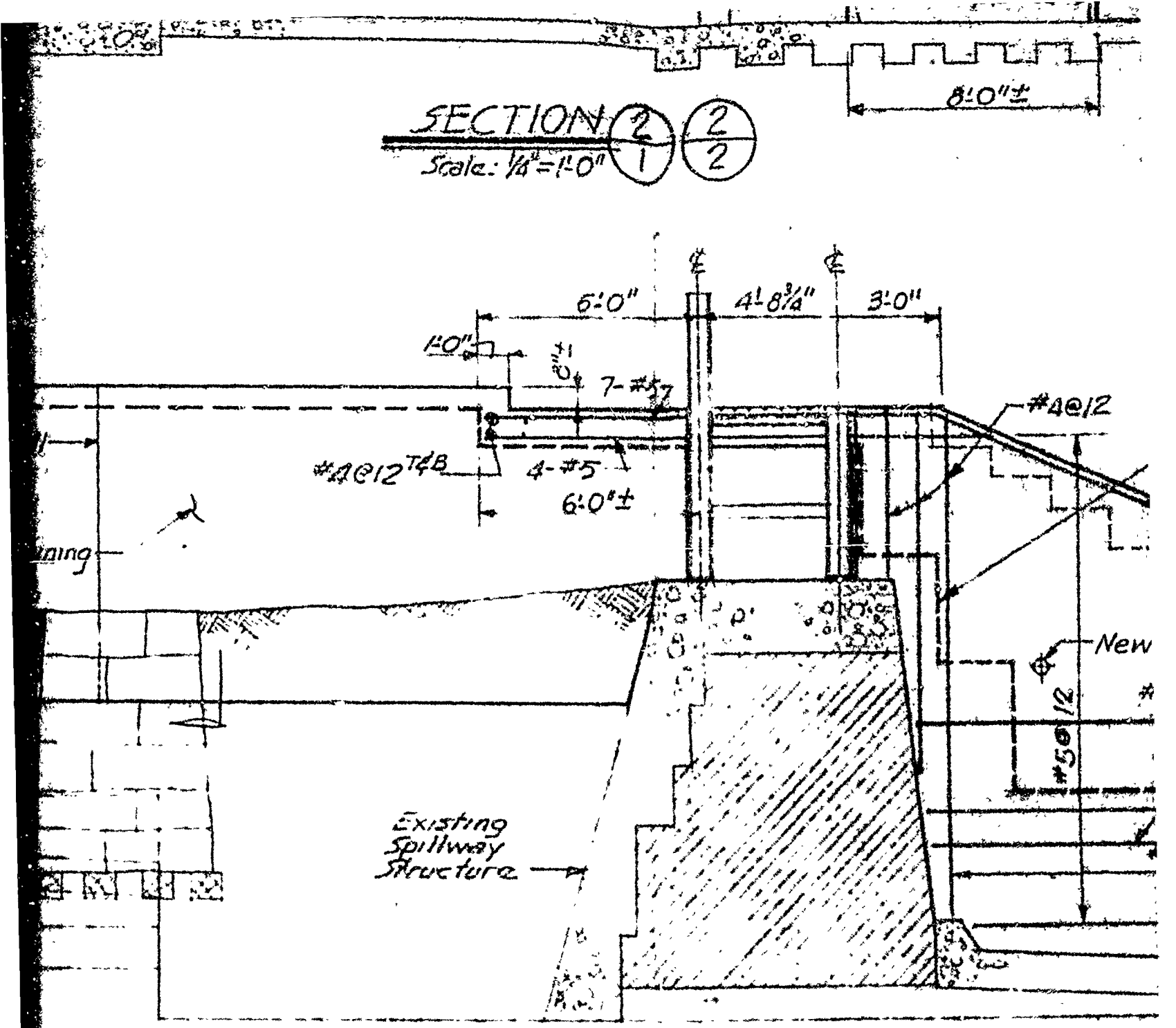


GROUTED-IN REINFORCING BAR ANCHORS
Scale: 1 1/2" = 1'-0"



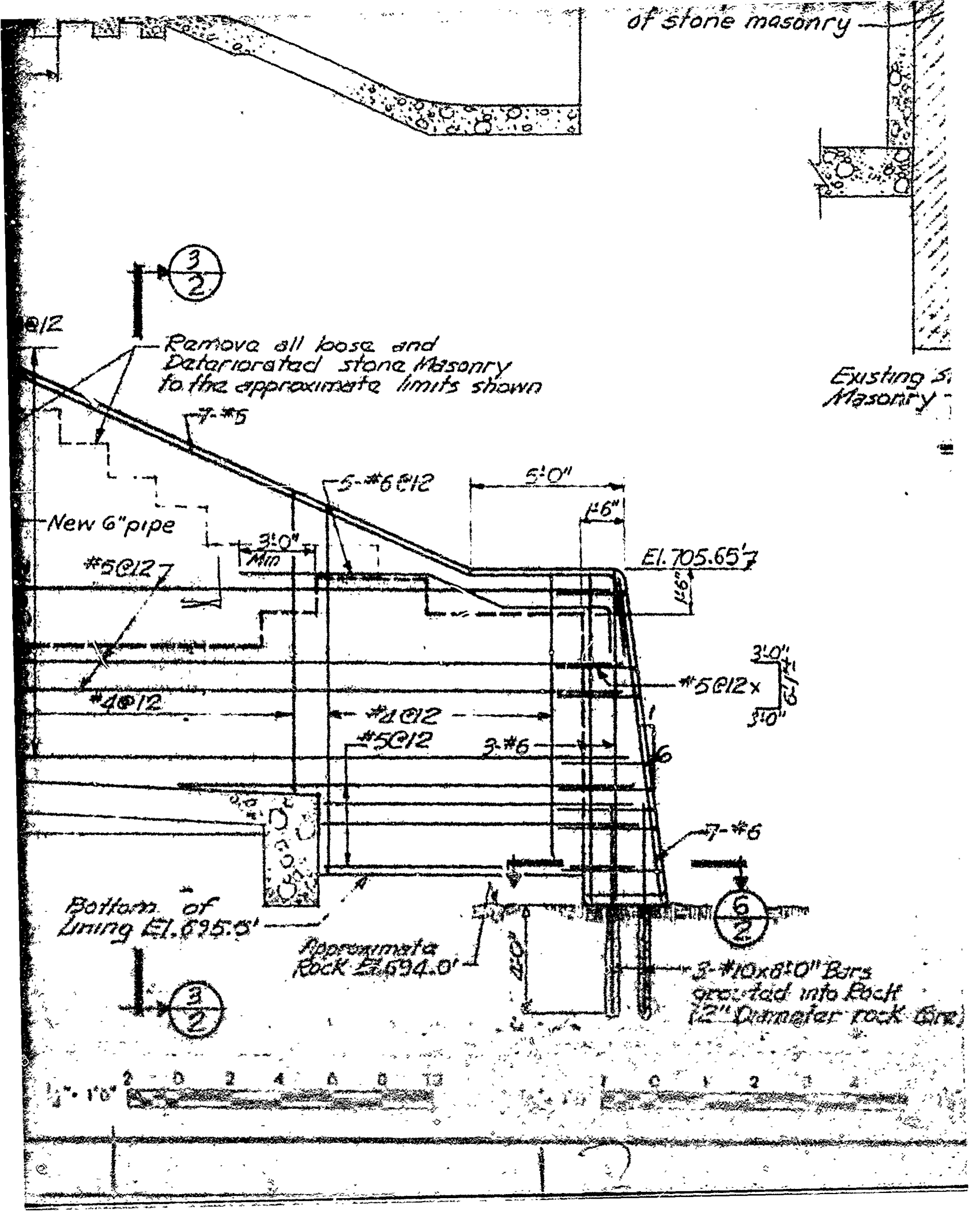
ALTERNATE CONCRETE ANCHORS
Scale: 1 1/2" = 1'-0"

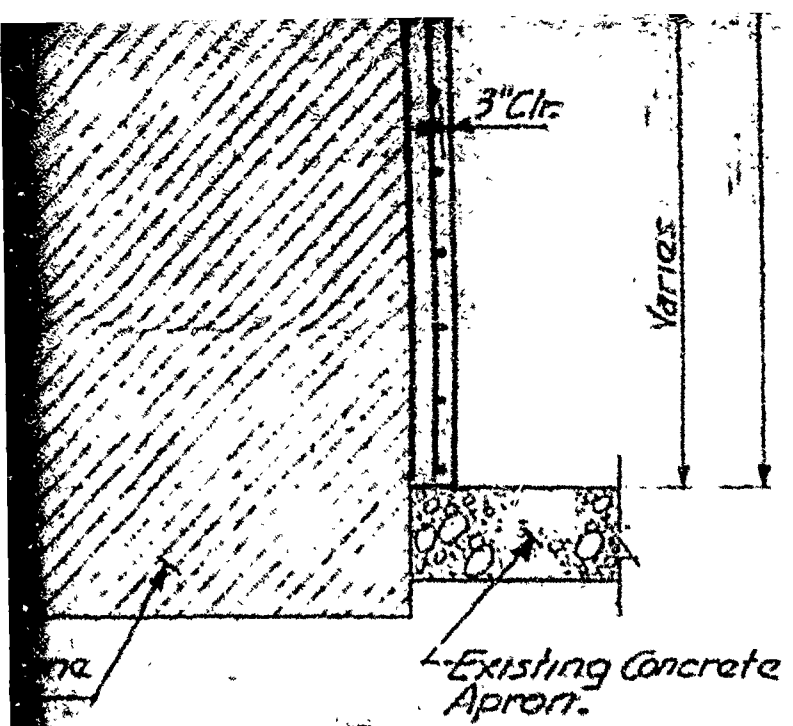

Grouted in reinforcing bar anchors. Max. spacing @ 3'-0 o.c. Vert. and 4'-0 o.c. Horiz. Typ. all faces. For installation, see Details this sheet
Top of Wall El. 716.50'
8" Typ.
Band in Wall
New Concrete Li
Existing Ground Surface
Bottom of Lining El. 706.83'
Top of existing precast Channel El. 703.3' ±
Existing Old Dam



SECTION 2/1 2/2
Scale: 1/8"=1'-0"

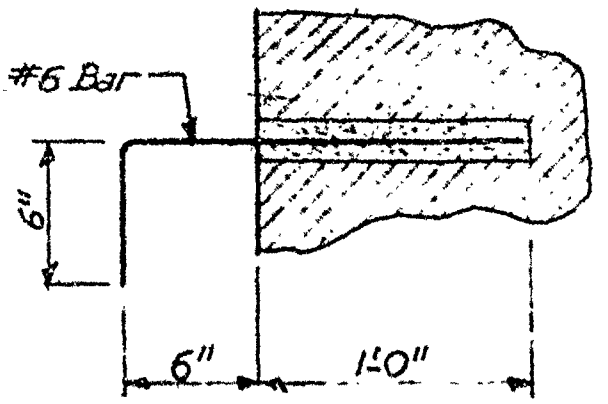
SECTION 5/1 5/2
Scale: 1/4"=1'-0"


of stone masonry
Existing S
Masonry
3/2
@12
Remove all loose and
Deteriorated stone Masonry
to the approximate limits shown
7-#5
5-#6@12
5'0"
1'6"
New 6"pipe
3'0"
Min
#5@12
El. 705.65'
1'6"
3'0"
#5@12 x
3'0"
#4@12
#4@12
#5@12
3-#6
6
7-#6
6/2
Bottom of
Lining El. 695.5'
Approximate
Rock El. 694.0'
4'0"
3-#10x6'0" Bars
grouted into Rock
(2" Diameter rock drill)
3/2
1/2" = 1'0"
2 - 0 2 4 6 8 10
1 0 1 2 3 4



SECTION 3/2
Scale: 1/2"=1'0"

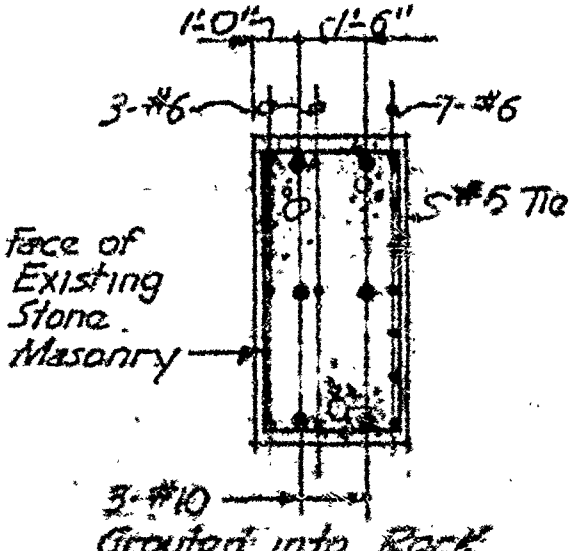
SECTION 4/2
Scale: 1/2"=1'0"



3/4"ϕ Threaded structural steel rod

Exist. Masonry

GROUTED-IN REINFORCING BAR ANCHORS
Scale: 1 1/2"=1'0"



SECTION 6/2
Scale: 1/4"=1'0"

REV.	DATE	DESCRIPTION

O'BRIEN & GERE ENGINEERS, INC.
Syracuse, New York

U.S. ARMY

DESIGNED: GAA
DRAWN: DRT
CHECKED: RKM
SUBMITTED:
RECOMMENDED:
CHIEF, ENGRG. DIVISION,
BUFFALO DISTRICT OFFICE

STATE DAI
OWASCO
AUBURN, N
LEFT ABUTMENT
SECTIONS &

APPROVED:
COL, CE. DISTRICT ENGINEER

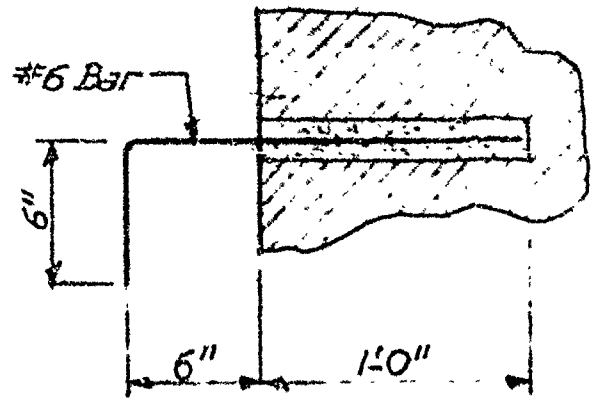
DATE:
SCALE:

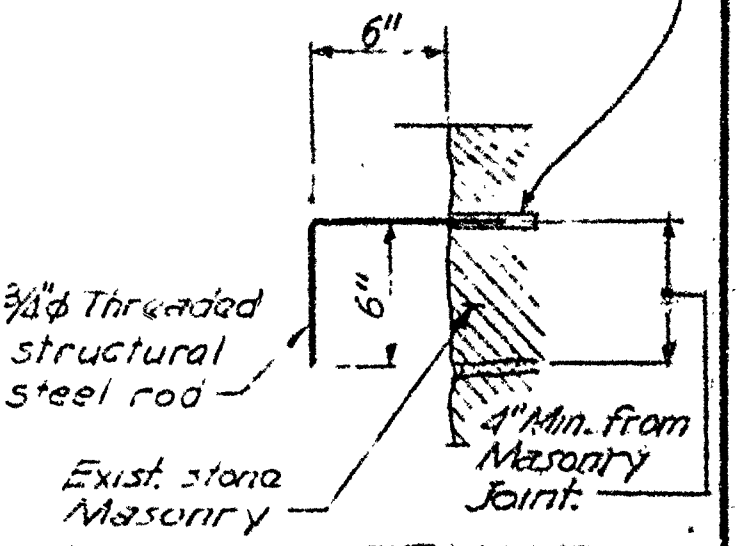
TO ACCOMPANY SPECIFICATIONS SERIAL NO. DACW 33-73-B-0021

SHEET

Scale: ½"=1'0" (2)

masonry only.





GROUTED-IN REINFORCING BAR ANCHORS

Scale: 1½"=1'0"

ALTERNATE CONCRETE ANCHORS

Scale: 1½"=1'0"

REV.	DATE	DESCRIPTION	BY

O'BRIEN & GERE ENGINEERS, INC.
Syracuse, New York

U.S. ARMY ENGINEER DISTRICT, BUFFALO
CORPS OF ENGINEERS
BUFFALO, NEW YORK 14207

DESIGNED: GAA
DRAWN: DRT
CHECKED: RKM
SUBMITTED:
RECOMMENDED:
CHIEF, ENGRG. DIVISION, BUFFALO DISTRICT OFFICE

STATE DAM REPAIRS
OWASCO OUTLET
AUBURN, NEW YORK
LEFT ABUTMENT & CENTER PIER
SECTIONS & DETAILS

APPROVED:
COL., C.E. DISTRICT ENGINEER

DATE: 20 SEPTEMBER 1972

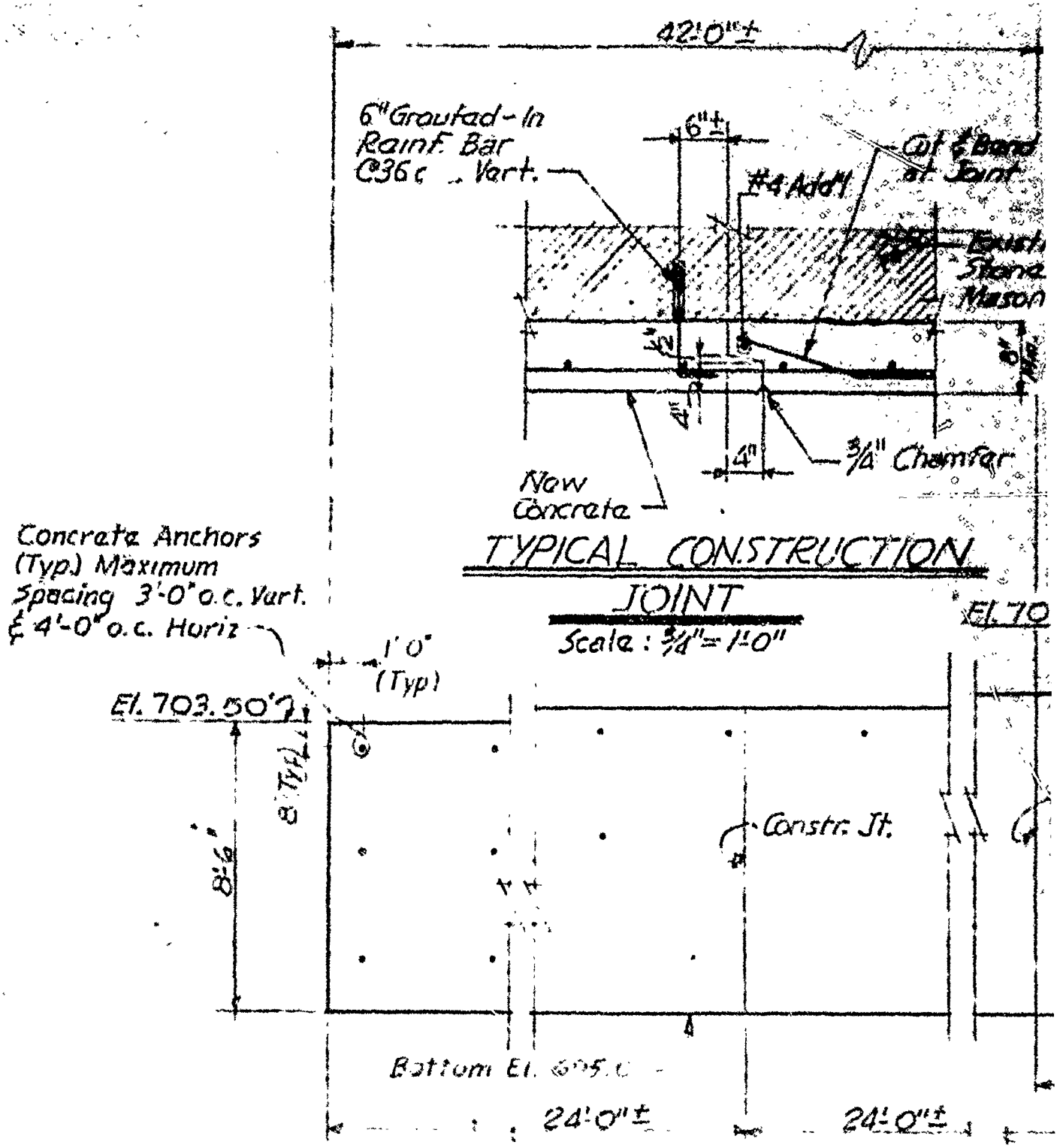
SCALE: AS SHOWN

TO ACCOMPANY SPECIFICATIONS SERIAL NO. DACW49-73-B-0021

DRAWING NUMBER
239-ADR-1/2

SHEET 2 OF 4

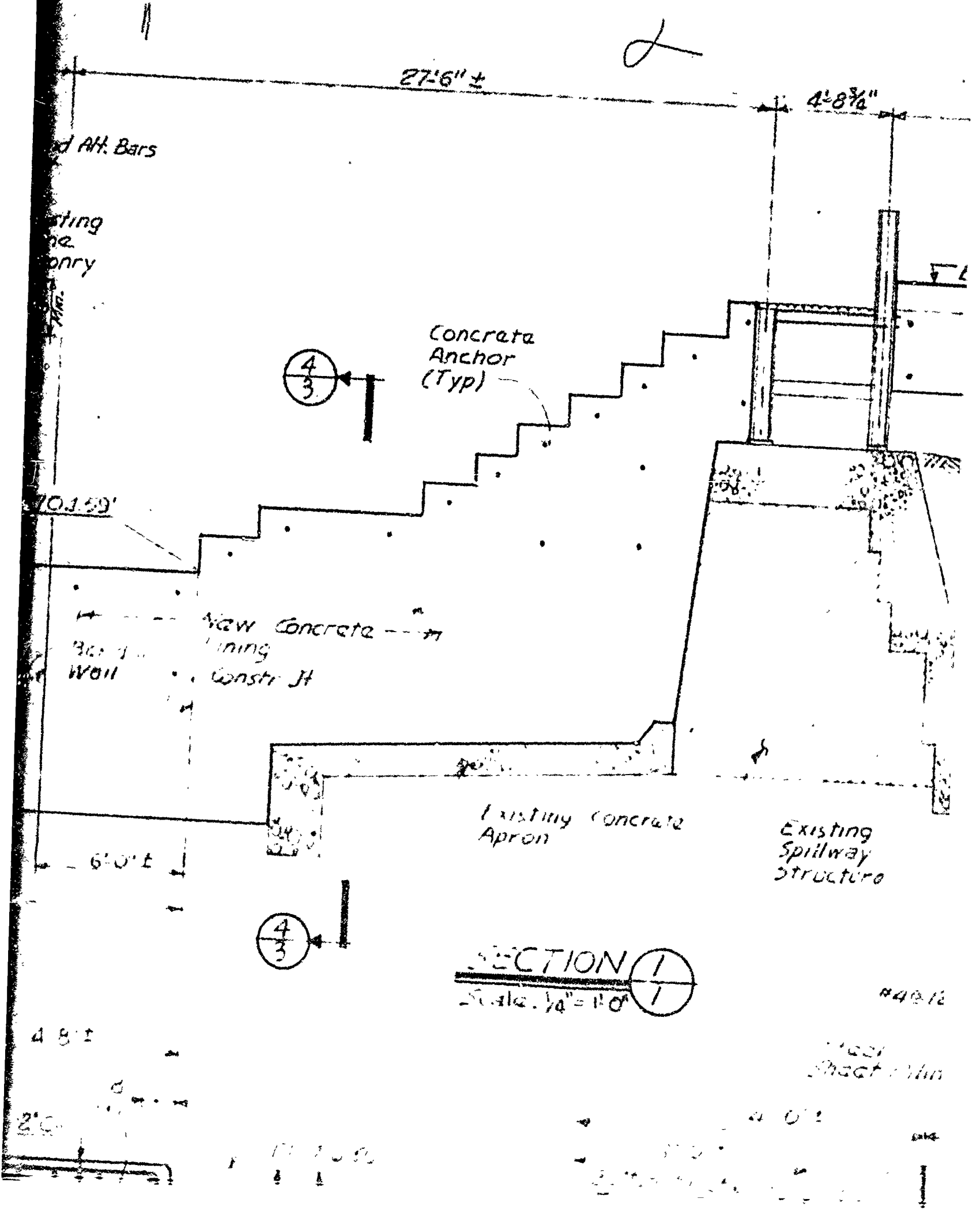
1



TYPICAL CONSTRUCTION JOINT

Scale: ¾"=1'-0"

4'-8"±


27'-6" ±
4'-8 3/4"
Concrete Anchor (Typ)
4/3
New Concrete
Existing Concrete Apron
Existing Spillway Structure
6'-0" ±
4/3
SECTION 1/1
Scale: 1/4" = 1'-0"

3

22'-0" ±

5/3

Concrete Anchor (Typ)

El. 716.50'

4'-0"

New Concrete Lining

Existing Ground Surface

Cut Back 3" Fillet on Existing Lining

10'-0"

Existing Concrete Lining

Steel Sheet Piling

Existing Cut Dam

2'-0"

Top of Wall El. 716.50

#5@12

#5@12

SECTION 3/3

Not to Scale

8"

4'-0"

Existing ½"ϕ Exp. Anchors & Steel Strip

4"

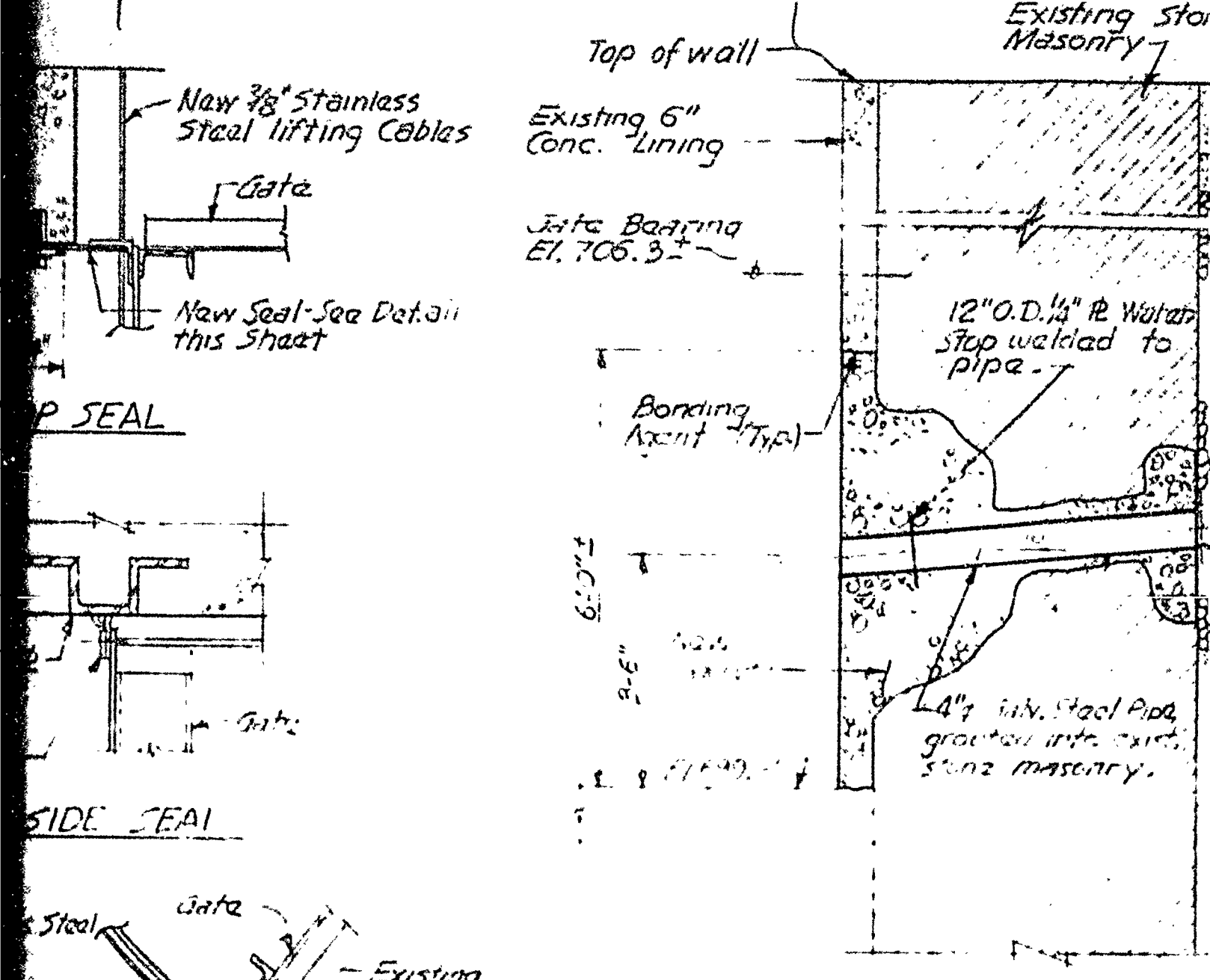
TOP

Existing Side Pl.

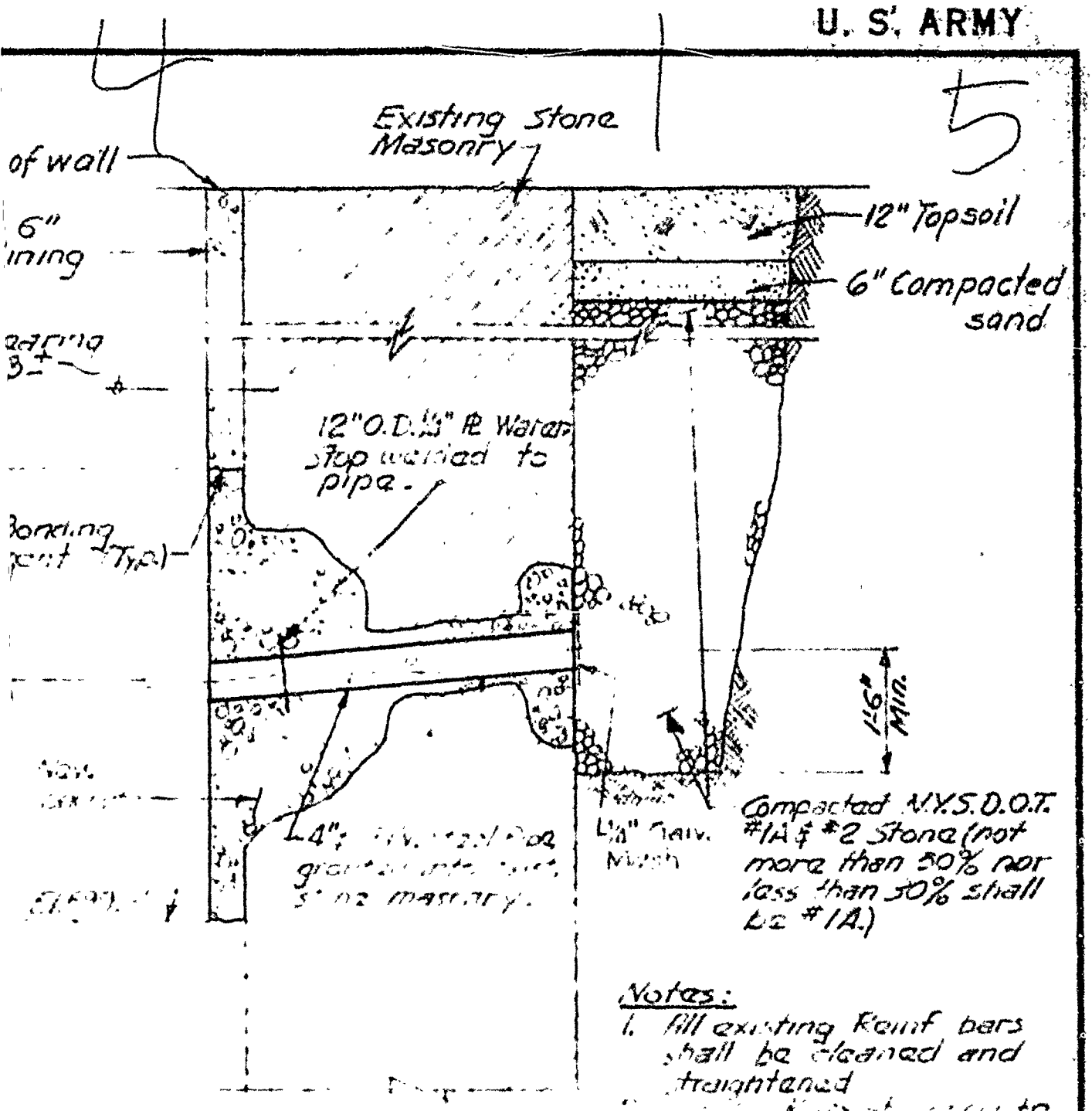
New Seal - See Detail This Sheet

New ⅜" Stainless S... lifting cables Fastened to Bottom of Gate. Encase Bottom in 3' Rubber ...se.

PAINTED


Existing Stoi
Masonry
Top of wall
New 3/8" Stainless Steel lifting Cables
Existing 6" Conc. Lining
Gate
Gate Bearing El. 706.3±
New Seal-See Detail this Sheet
12"O.D. 1/4" Rt Water Stop welded to pipe
Bonding Agent (Typ.)
4"ø Inv. Steel Pipe grouted into exist. stone masonry.
P SEAL
SIDE SEAL
Gate
Steel
Existing Bottom Rt
New Seal
BOTTOM SEAL
SECTION 2/2
Scale: 1/2" = 1'0"
ER GATE DETAIL
New steel
-32 Clamp

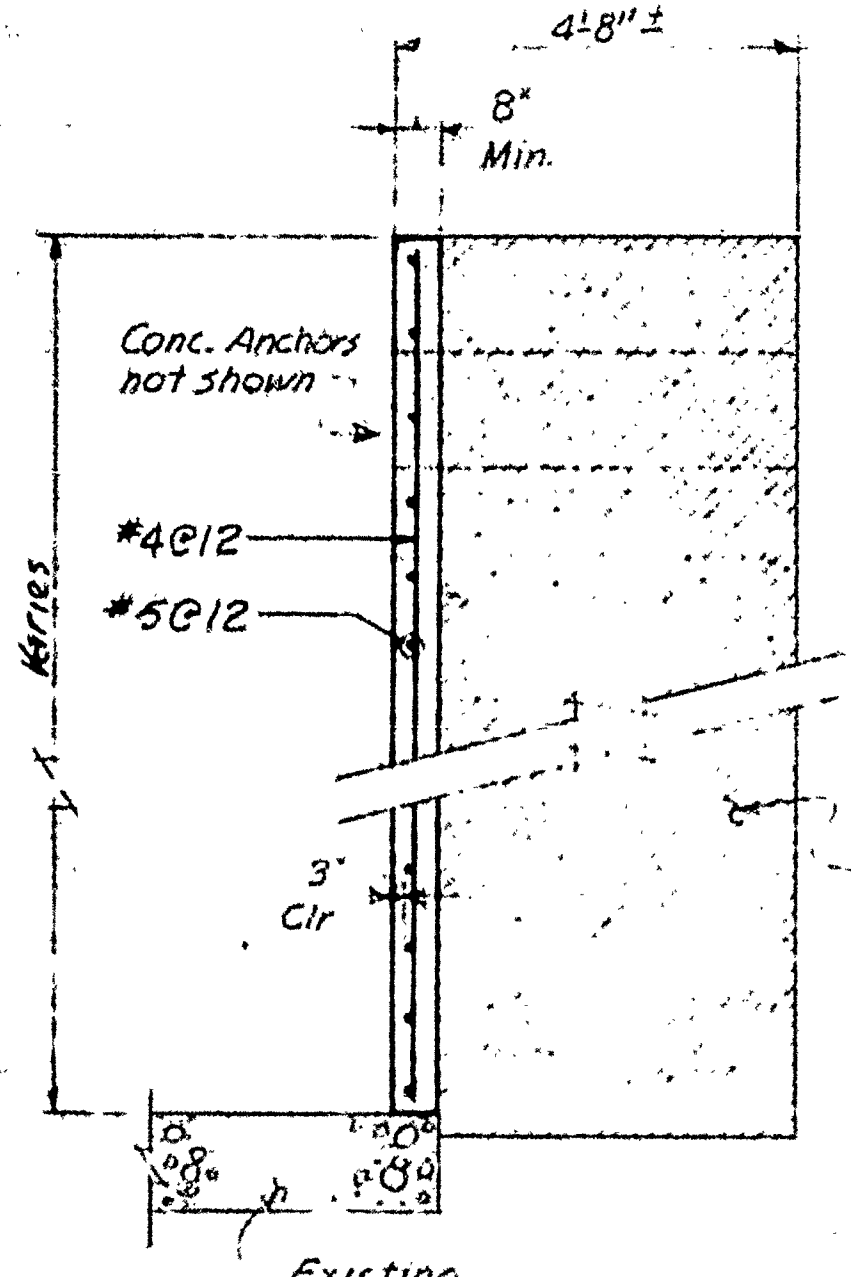
U. S. ARMY



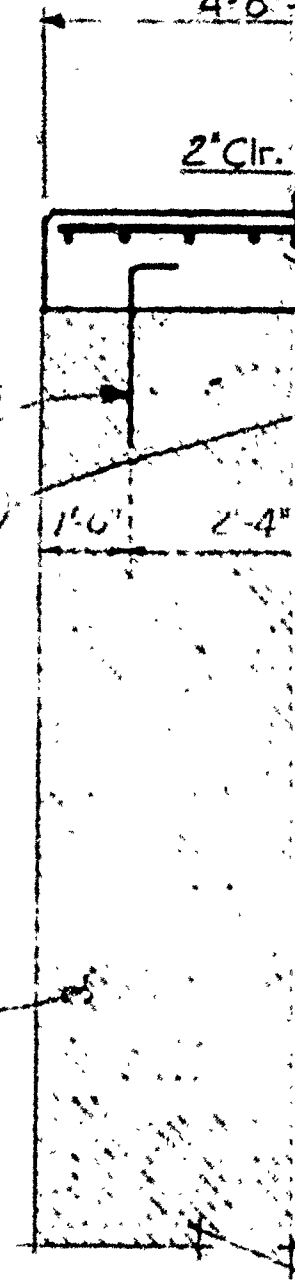
Notes:

1. All existing Reinf bars shall be cleaned and straightened
2. Provide anchors into existing stone Masonry as directed.

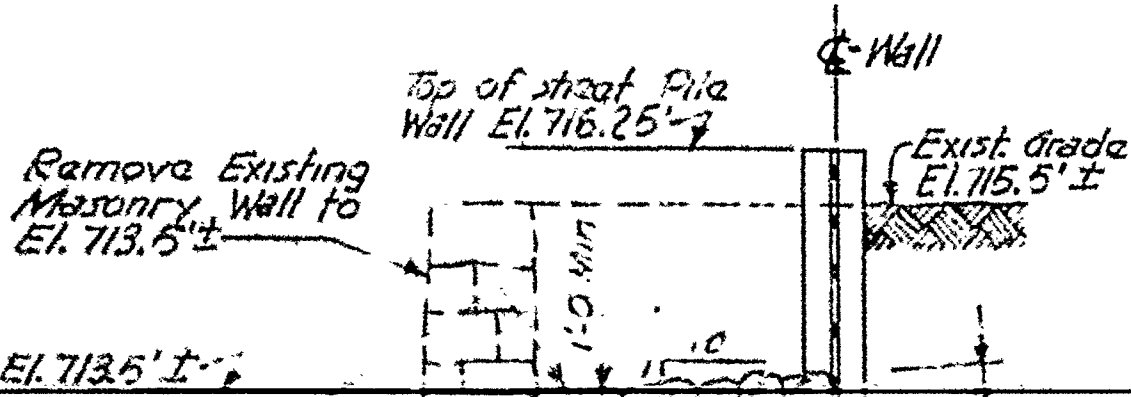
SECTION 2/2

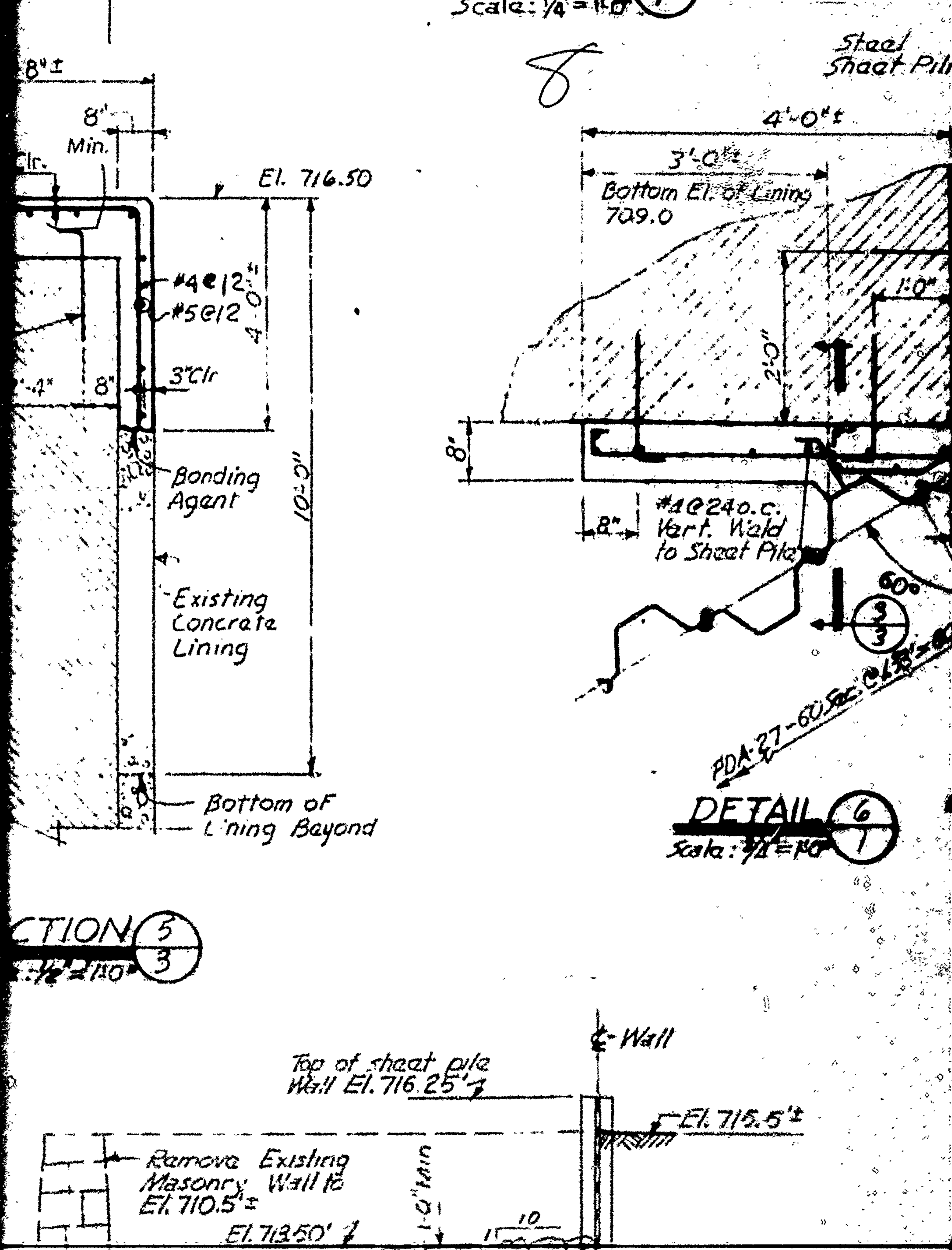


SECTION 4/3
Scale: 1/2" = 1'-0"

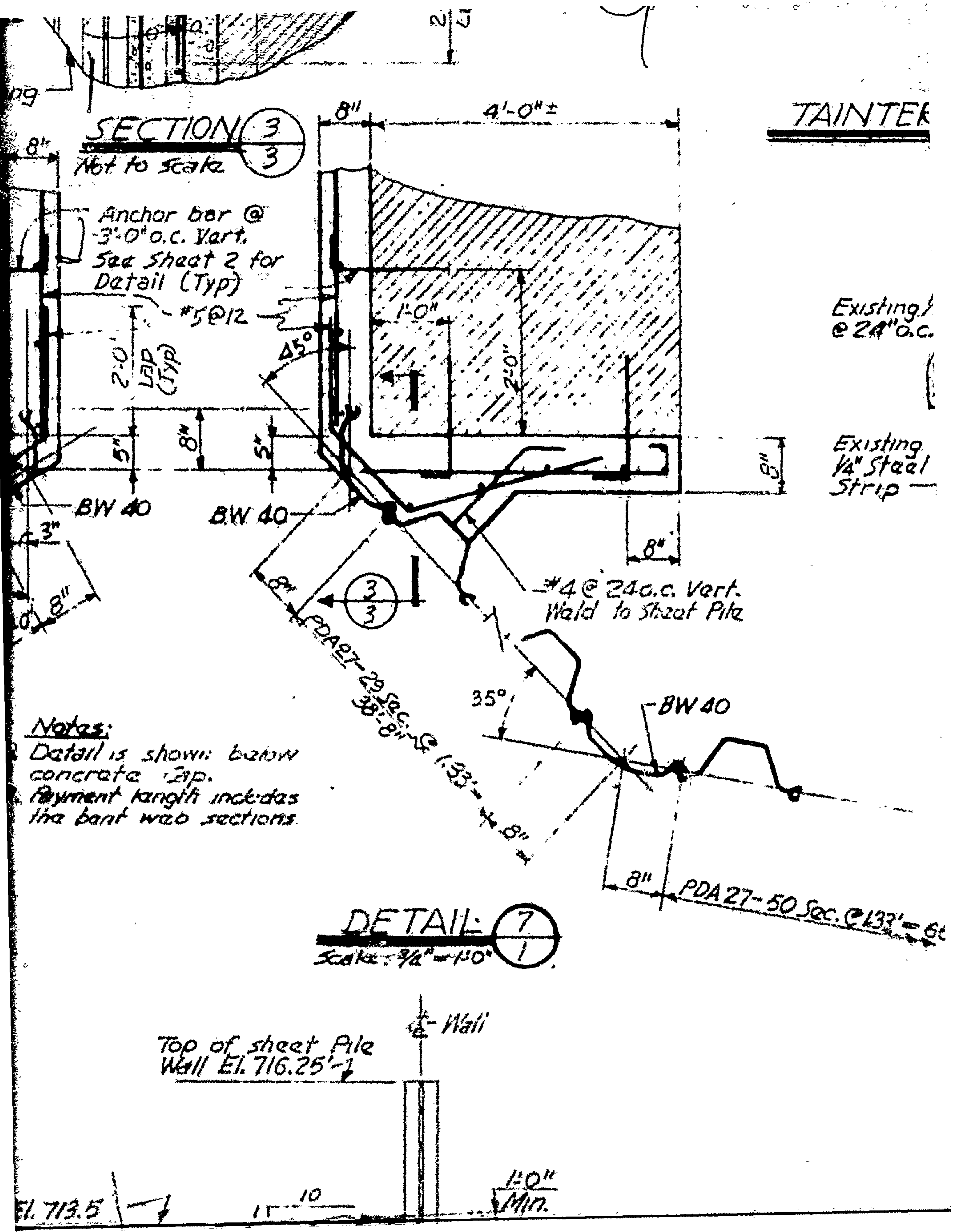


SECT
Scale: 1/2





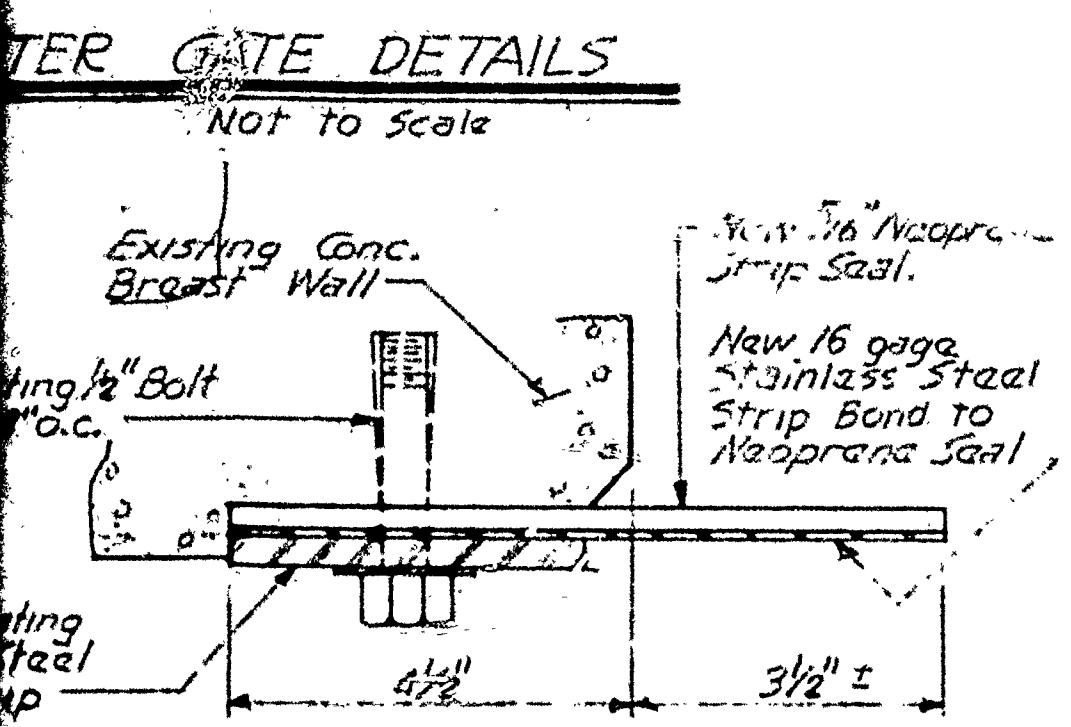
Scale: 1/4"=1'-0"
8
Steel Sheet Pil
8"±
8" Min.
Clr.
El. 716.50
#4@12"
#5@12
4'-0"±
3"Clr
-4"
8"
10'-0"
Bonding Agent
Existing Concrete Lining
Bottom of Lining Beyond
4'-0"±
3'-0"±
Bottom El. of Lining 709.0
1'-0"
2'-0"
8"
#4@24 o.c. Vert. Weld to Sheet Pile
8"
60°
3/3
PDA-27-60 Sec. @ 1'-8" c.
DETAIL 6/1
Scale: 1/2"=1'-0"
SECTION 5/3
1/2"=1'-0"
℄-Wall
Top of sheet pile Wall El. 716.25'±
El. 715.5'±
Remove Existing Masonry Wall to El. 710.5'±
1'-0" Min.
El. 713.50'±
10

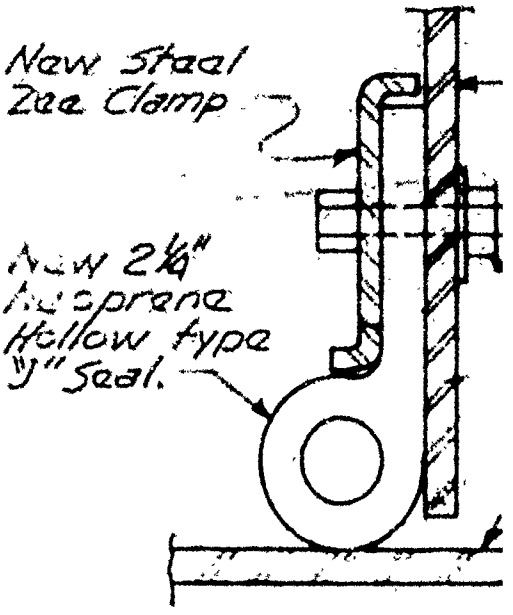

SECTION 3/3
Not to scale
TAINTER
8"
4'-0"±
Anchor bar @ 3'-0" o.c. Vert.
See Sheet 2 for Detail (Typ)
#5@12
2'-0" Lap (Typ)
1'-0"
2'-0"
45°
8"
5"
BW 40
Existing
@ 24"o.c.
Existing 1/4" Steel Strip
3"
#4 @ 24 o.c. Vert. Weld to Sheet Pile
PDA27-29 Sec. 38'-8" @ 1.33'
35°
BW 40
Notes:
Detail is shown below concrete cap.
Payment length includes the bent web sections.
PDA 27-50 Sec. @ 1.33' = 66
DETAIL 7/1
Scale: 3/4" = 1'-0"
℄ Wall
Top of sheet Pile Wall El. 716.25'
1'-0" Min.
El. 713.5
10

BOTTOM SEAL

TER GATE DETAILS

Not to Scale





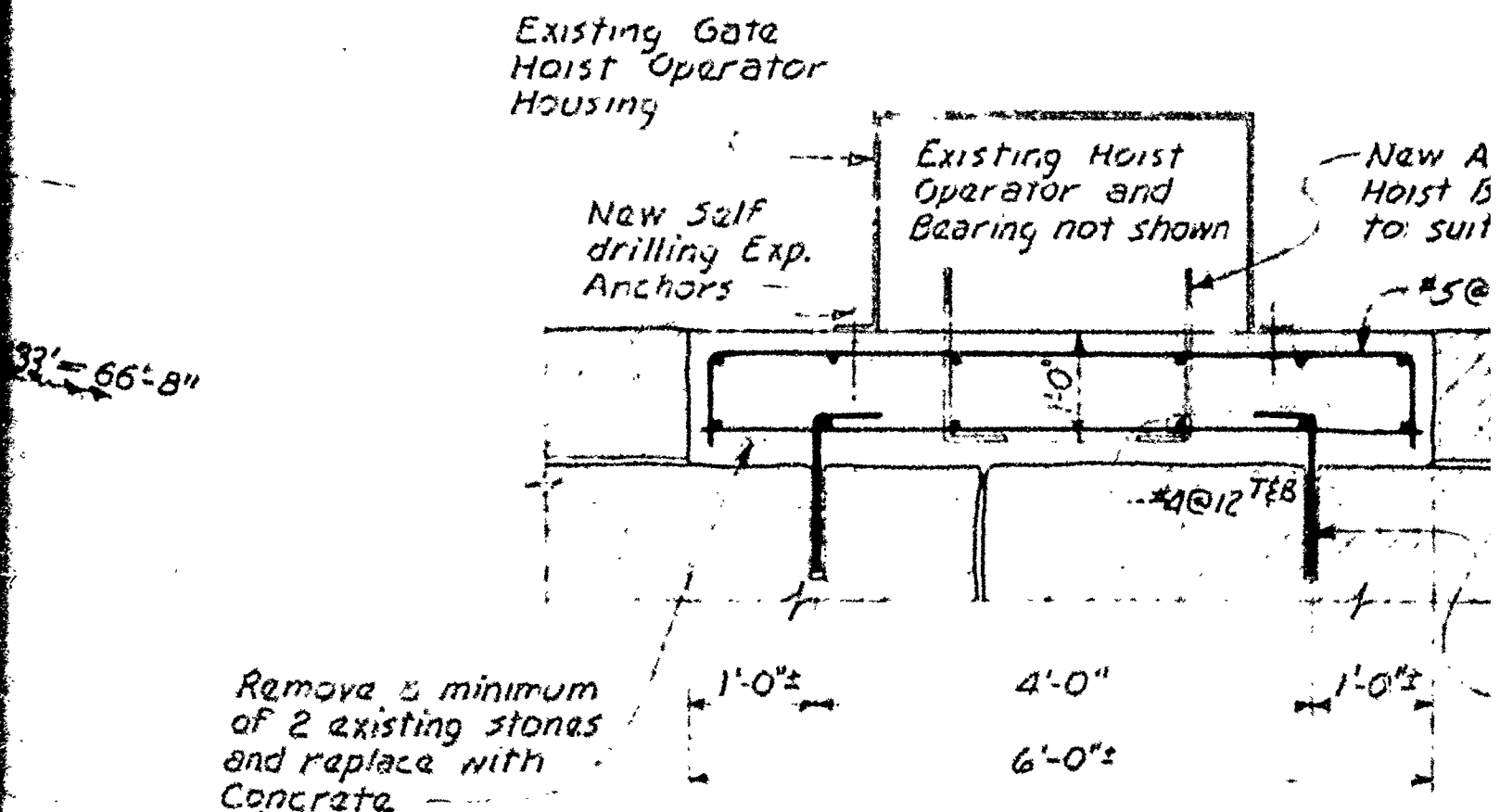
Notes:

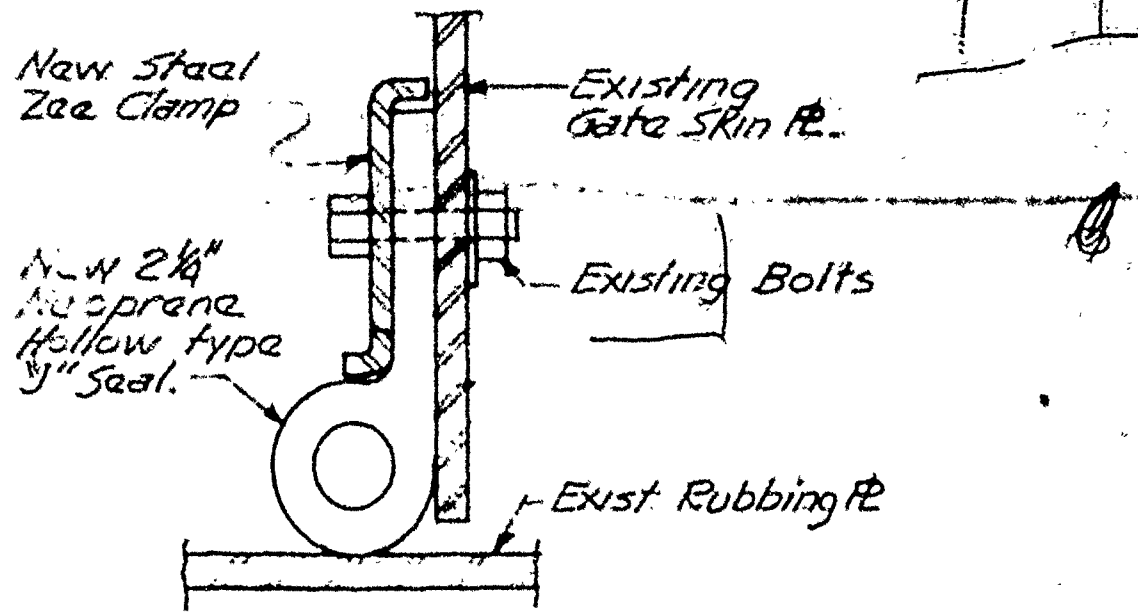
1) Provide new bolts as required to replace damaged bolts.
2) Installation of the seals shall be as approved or directed by the Contracting officer.

TOP SEAL DETAIL

BOTTOM & SIDE

Not to Scale

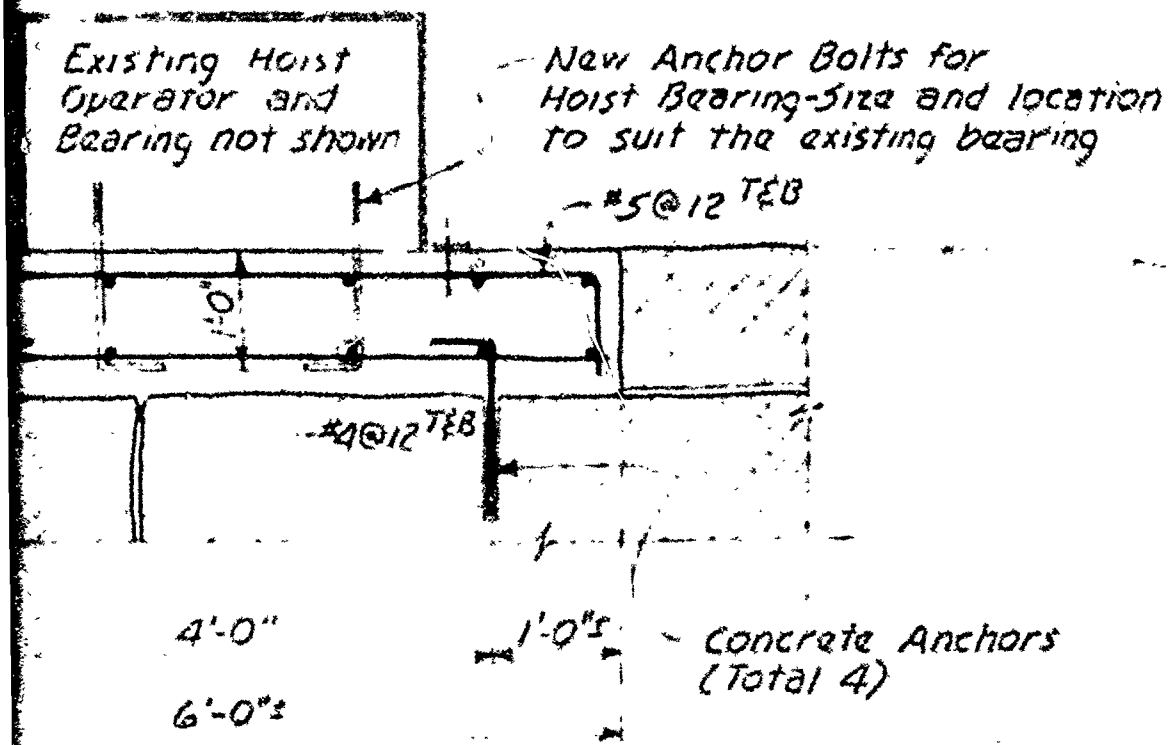




ired to replace damaged bolts.
shall be as approved or
ing officer.

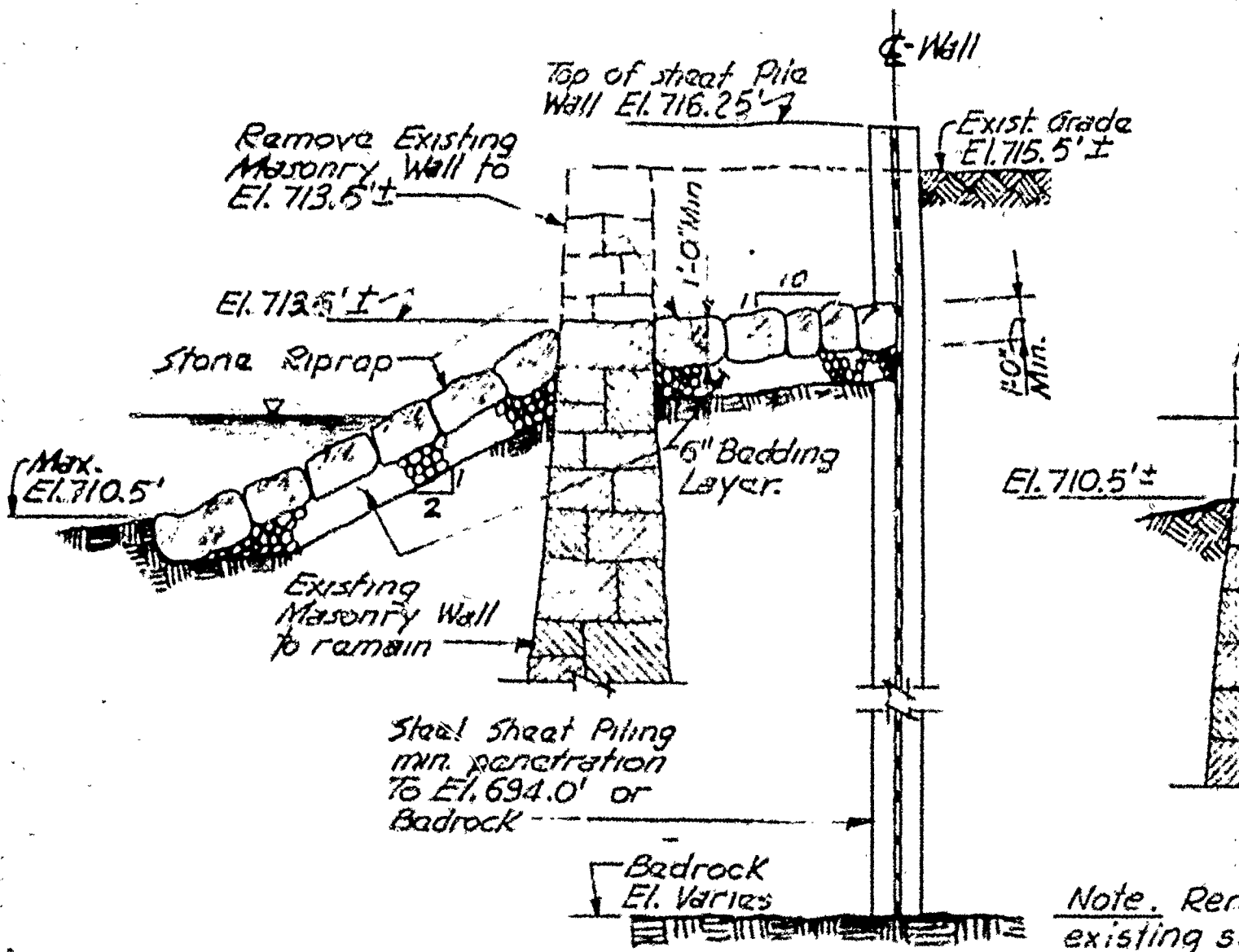
BOTTOM & SIDE SEAL DETAIL

Not to Scale



Existing
Concrete Apron

SECTION 4/3
Scale: 1/2"=1'-0"



Note. Rem
existing s
may be us

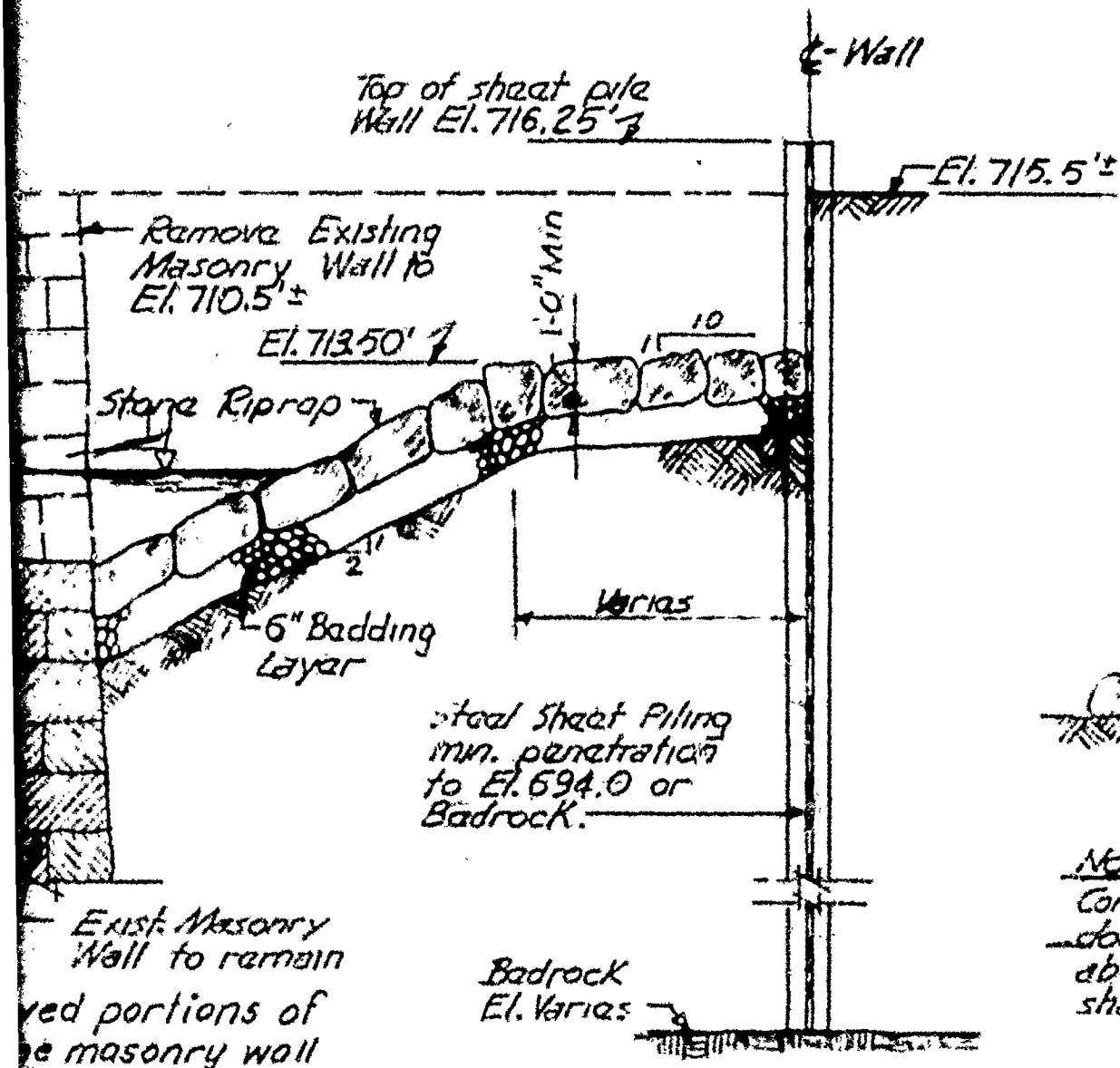
SECTION 8/1
Scale: 3/8"=1'-0"

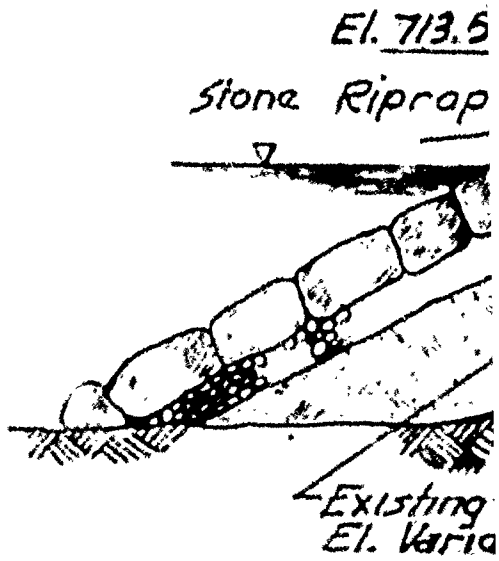
Bottom of Lining Beyond

DETAIL 6/1
Scale: 3/4"=1'0"

2. Remm the b

ION 5/3
1'0"



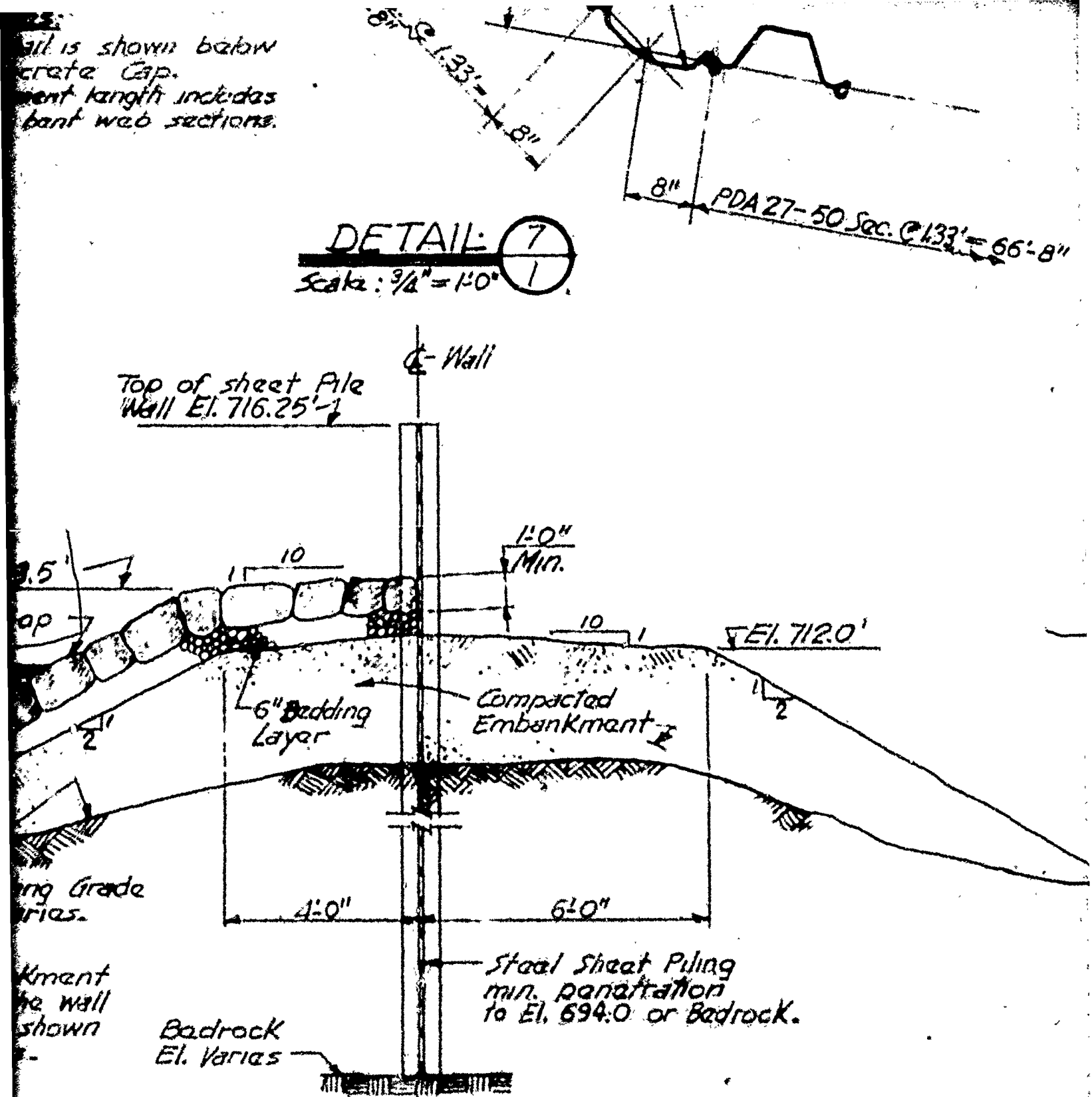


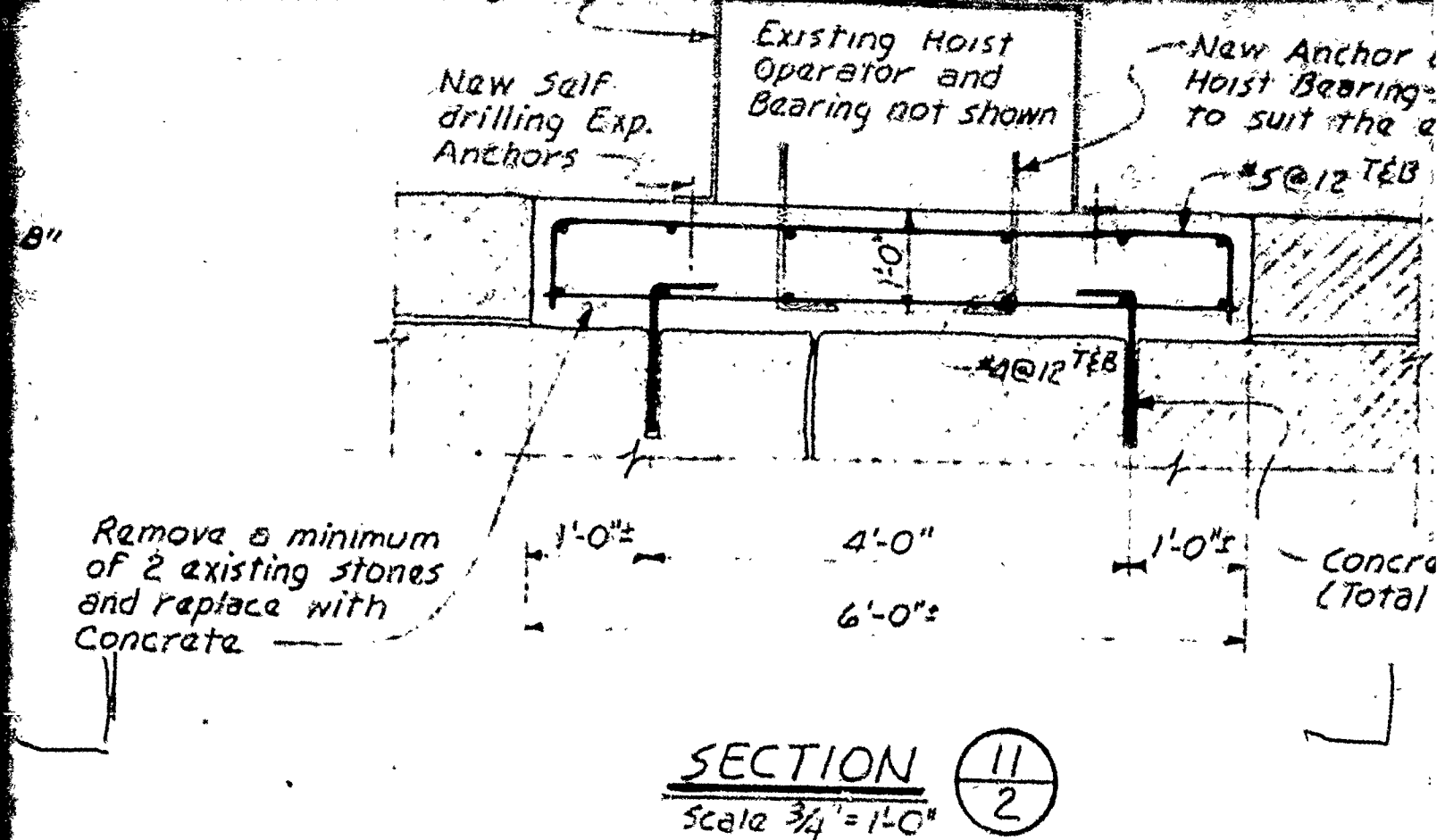
Note:
Compacted Embankm
down stream of the
above the limits sho
shall be by Others.

ved portions of
e masonry wall
for riprap.

SECTION 9/1
Scale: 3/8"=1'-0"

SEC
Scale:


Wall is shown below
crete Cap.
ent length includes
bank wall sections.
8" @ 1:33' = 8"
8"
PDA 27-50 Sec. @ 133' = 66'-8"
DETAIL 7/1
Scale: 3/4" = 1'-0"
℄ Wall
Top of sheet Pile
Wall El. 716.25'
1:0" Min.
10
1
10
1
El. 712.0'
6" Bedding Layer
Compacted Embankment
2
1
2
1
ng Grade
ries.
kment
he wall
shown
4'-0"
6'-0"
Steel Sheet Piling
min. penetration
to El. 694.0 or Bedrock.
Bedrock
El. Varies
ECTION 10/1
le: 3/16" = 1'-0"



SECTION (11/2)

Scale 3/4" = 1'-0"

REV.	DATE	DESCRIPTION

O'BRIEN & GERE ENGINEERS INC.
Syracuse, New York

U.S. ARMY

DESIGNED: GAA
DRAWN: DRT
CHECKED: RKM
SUBMITTED:

RECOMMENDED:
CHIEF, ENGRG. DIVISION,
BUFFALO DISTRICT OFFICE

APPROVED:
COL, C.E. DISTRICT ENGINEER

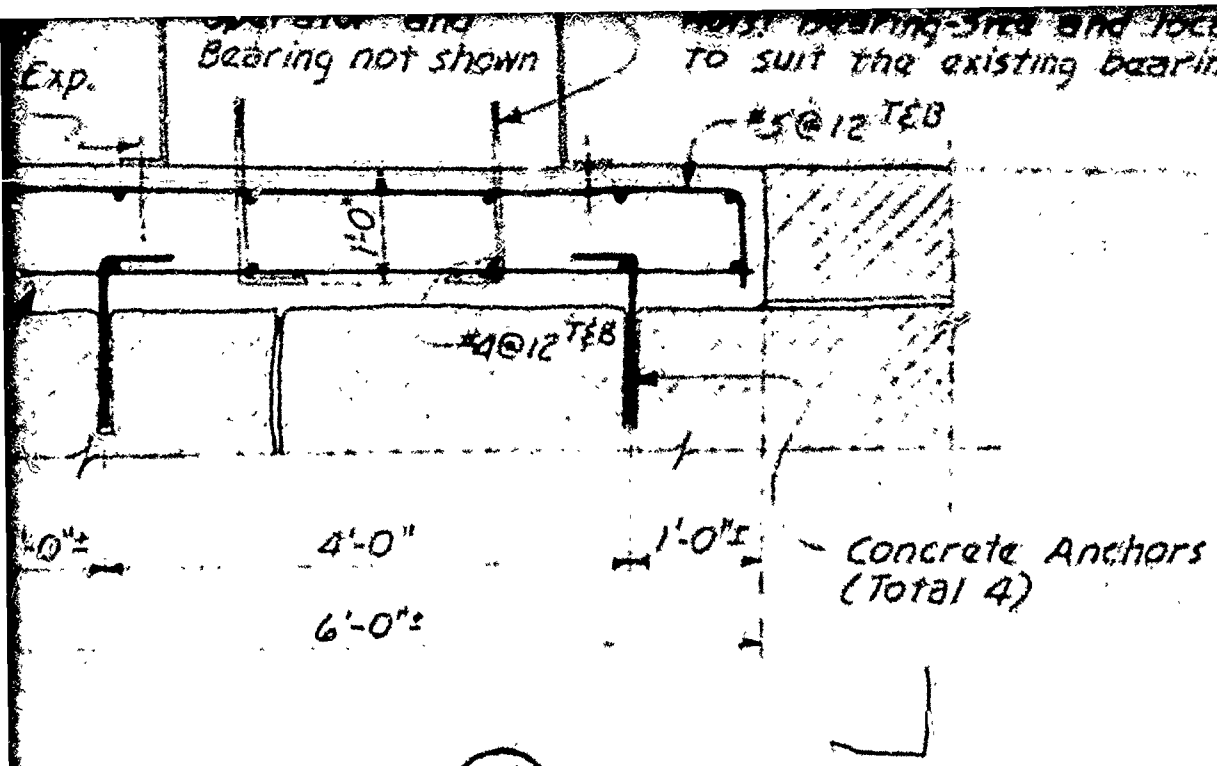
STATE DAM
OWASCO
AUBURN, N
RIGHT ABUTMENT &
SECTIONS &

DATE:

SCALE:

TO ACCOMPANY SPECIFICATIONS SERIAL NO. DACW49-73-B-0021

SHEET



SECTION 11/2

Scale 3/4" = 1'-0"

REV.	DATE	DESCRIPTION	BY

O'BRIEN & GERE ENGINEERS, INC.
Syracuse, New York

U.S. ARMY ENGINEER DISTRICT, BUFFALO
CORPS OF ENGINEERS
BUFFALO, NEW YORK 14207

DESIGNED: GAA
DRAWN: DRT
CHECKED: AKM
SUBMITTED: [signature]
RECOMMENDED: [signature]
CHIEF, ENGRG. DIVISION, BUFFALO DISTRICT OFFICE

STATE DAM REPAIRS
OWASCO OUTLET
AUBURN, NEW YORK
RIGHT ABUTMENT & MISCELLANEOUS SECTIONS & DETAILS

APPROVED: [signature]
COL, C.E. DISTRICT ENGINEER

DATE: 20 SEPTEMBER 1972

SCALE: AS SHOWN

TO ACCOMPANY SPECIFICATIONS SERIAL NO. DACW49-73-B-0021

DRAWING NUMBER 239-ADR-1/3

SHEET 3 OF 4